P19 3

THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL MAY, 1938

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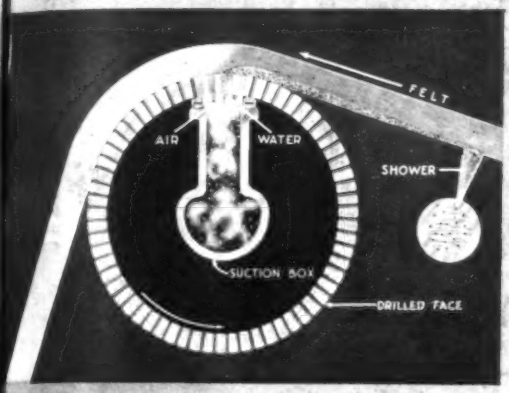


Suction Felt Roll

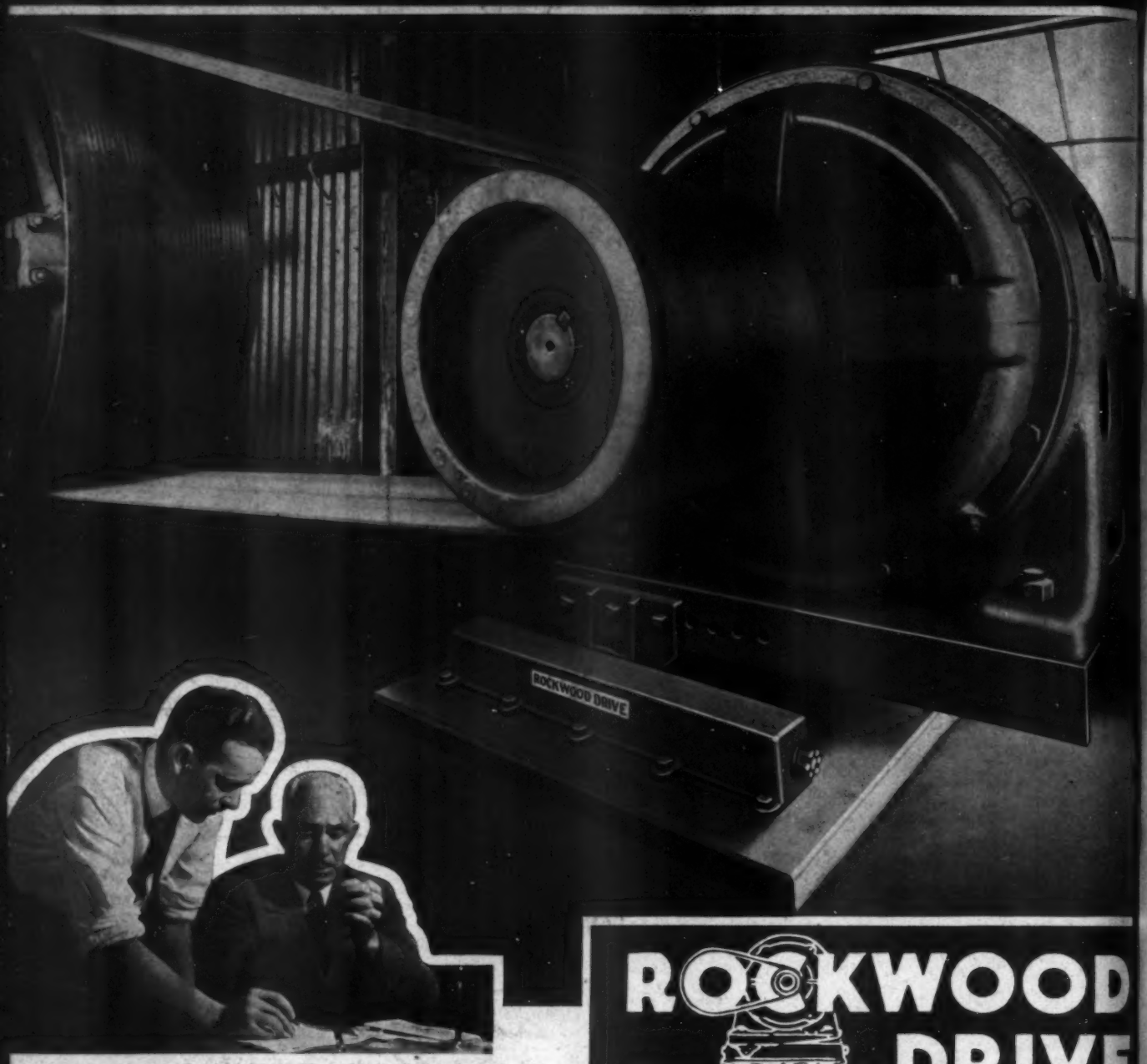
D

Full Width Cleaning CONTINUOUSLY

The dotted area in the photograph indicates the suction box which extends entirely across the drilled face, inside of the Downingtown Suction Felt Cleaning Roll. No active part of the felt escapes this straight line cleaning zone, thus the cleaning action is uniform, straight across the full width of the felt...The sectional drawing shows why continuous operation cannot damage the felt nap. The travel of the felt turns the drilled shell of the roll, thus there is no friction drag over the box, no stretching of felt, no ironing of felt nap and NO POWER REQUIRED TO DRIVE THE ROLL ...This modern felt cleaning method invariably saves its cost in a few months' time...

« « « Catalog on request » » »

DOWNINGTOWN MANUFACTURING CO., DOWNINGTOWN, PA.



150 HP Barber drive in the new Fernandina, Florida, pulp mill of Container Corpora- n of America. See how part of the motor weight, cradled in the belt, is used to first ablish and then maintain the minimum belt tension required to handle the maximum load thout belt slip. The Barber is a tough drive so, in this case, quite a lot of the motor ght is used. Belt stretch is taken care of at all times. Most important—as starting or peak loads, the belt tension automatically increases and it then reduces again as soon the load drops off. Is it any wonder driven machines perform better, belts last longer, drive maintenance is decreased.

ROCKWOOD PIVOTED MOTOR DRIVE

ROCKWOOD *pivoted-motor* SHORT-CENTER DRIVES IMPROVE THE PERFORMANCE OF PAPER MILL MACHINERY.

WHEN new mills start up you will find Rockwood Drives on many of their hard drives. The new pulp mill of the Container Corporation of America at Fernandina, Florida, has three big ones—one the Barker Drum drive, shown above, and two Rockwood Vertical-Type Drives, driving almost straight up to lineshafts, from motors of 200 HP, weighing 4700 and 7800 lbs., respectively.

The best way for you to understand what these drives will do *for you* is to install one or more drives in your own mill where you can observe the improvement in driven machine performance, the almost total absence of maintenance and check the very real power savings. Paper mill superintendents who have done this say that the Rockwood Drive gives them "for the first time a truly satisfactory short-center drive from electric motors."

The Rockwood Drive is peculiarly *THE* drive for hard, sharp, loads, characteristic of paper mill machinery. On large motors the saving in cost is an agreeable surprise, for not only is the Rockwood Drive a *superior* short-center motor drive but *it usually costs less.* GET STARTED WITH THESE FINE DRIVES. You can put in any number you wish on trial.

WRITE FOR A ROCKWOOD ENGINEER TO TELL YOU HOW THIS DRIVE CAN IMPROVE THE PERFORMANCE OF *YOUR* MACHINERY AND SAVE *YOU* MONEY. Many of the large Rockwood Drives in paper mills pay for themselves well *within* the first year.

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PURE TITANIUM DIOXIDE

For RUBBER LATEX
Compounding, and Vulcanizing Chemicals together with technical literature on their use

VANZYME
An Enzyme for Converting both Raw Corn and Tapioca
McNAMEE CLAY
Low Grit and Low Abrasion

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R. T. VANDERBILT CO., INC. • 230 PARK AVENUE, NEW YORK

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users

Confounding the skeptics . . .

The favorite job of the Morris Engineers is to prove how often the "impossible" is possible in pumping operations. Many are the instances in which Morris Pumps are developing "impossible" efficiencies, handling "impossible" mixtures, operating under "impossible" conditions, and lasting "impossibly" long. If you have a difficult problem involving the handling of paper mill liquids, don't give it up, give it to the Morris Engineers. They'll give you the answer.

Replacements with a bonus . . . . .

On severe services, pump parts which are subject to wear are bound to give out eventually. When they do, a replacement becomes necessary, and this is where you can get a bonus from Morris. Recent advances in Morris Pump designs have developed such astonishingly high efficiencies that a new Morris impeller, suction throat ring or casing will frequently produce a marked decrease in power consumption as well as equalling or even exceeding the original pump capacity. Remember the Morris bonus when you need new parts for old Morris installations or need new pumps for any requirement.

For authoritative recommendations on any pumping problem, write to
Morris Machine Works, Baldwinsville, N. Y.
Representatives in principal cities.

THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

Devoted to the Interests of the Pulp and Paper Industry

MAY, 1938
Vol. 20—No. 2

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SAVE MONEY ...MAKE BETTER PULP AND PAPER

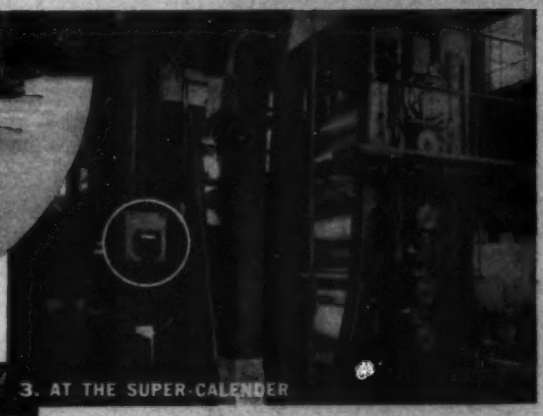
5 WAYS TO MODERNIZE WITH TAYLOR CONTROL

1. IN THE GRINDING ROOM

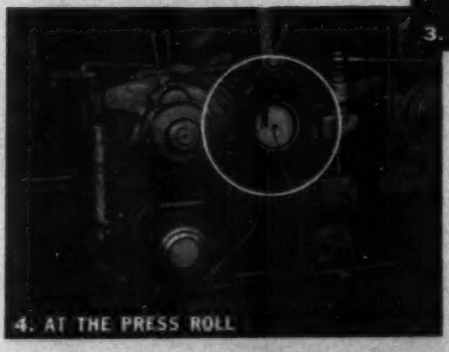
1. Automatic Control of grinder temperature maintained within plus or minus 1° F. is the job of the Taylor Fulscope Recording Controller (shown in close-up). The results: increased production, decreasing power consumption and costs, much slower stone wear, fewer reburrings, less fracturing of the stone. You save money and get more and better pulp.

E DIGESTER ROOM

2. Automatic Control of sulphite digester temperatures and pressures eliminates extreme variations in the cooking time, increases digester capacity for each 24 hours, provides uniform cooking conditions and reduces steam costs. Taylor Fulscope Controller helps to save money and produce better pulp.


3. AT THE SUPER-CALENDER

3. Use the Taylor Calender Roll Pressure Indicator to eliminate variations in the pressure on the two ends of the calender roll and assure a more uniform sheet, reduce power consumption, lengthen life of intermediate cotton or fibre rolls. This instrument helps to maintain the desired pressure across the entire width of the sheet.


4. AT THE PRESS ROLL

4. Cut paper drying costs, add to press operating efficiency, cut felt cost and improve paper quality by using the Taylor Press-Roll Load Recorder. It enables the operator to maintain a uniform pressure across the entire sheet width.

ASSURE for your mill the most modern, efficient and economical control methods. The pictures on this page show how Taylor engineers have helped mills in this country and Canada.

Taylor engineers have led the field in perfecting these developments. Let them work with you to see how these systems of control can be adapted to your mill. Get the facts about these installations from a Taylor representative. If you want this service immediately, write to Taylor Instrument Companies, Rochester, N.Y. Plant also in Canada. Manufacturers in Great Britain–Short & Mason, Ltd., London, England.

5. IN THE BEATER ROOM

5. Reduce average beating time to a minimum, increase beating capacity, save power costs and get more uniform pulp at lower cost with the Taylor Beater Roll Pressure Recorder. It is a check on beating efficiency.

Taylor

Indicating · Recording · Controlling

TEMPERATURE, PRESSURE, FLOW and LEVEL INSTRUMENTS

Cushioned

You can be sure of lower maintenance and replacement costs with Texaco Crater. This lubricant stays put. It safely resists wear, shock, and wiping pressure under conditions where other greases squeeze out, or throw off.

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TEXACO

action

FOR GEAR TEETH

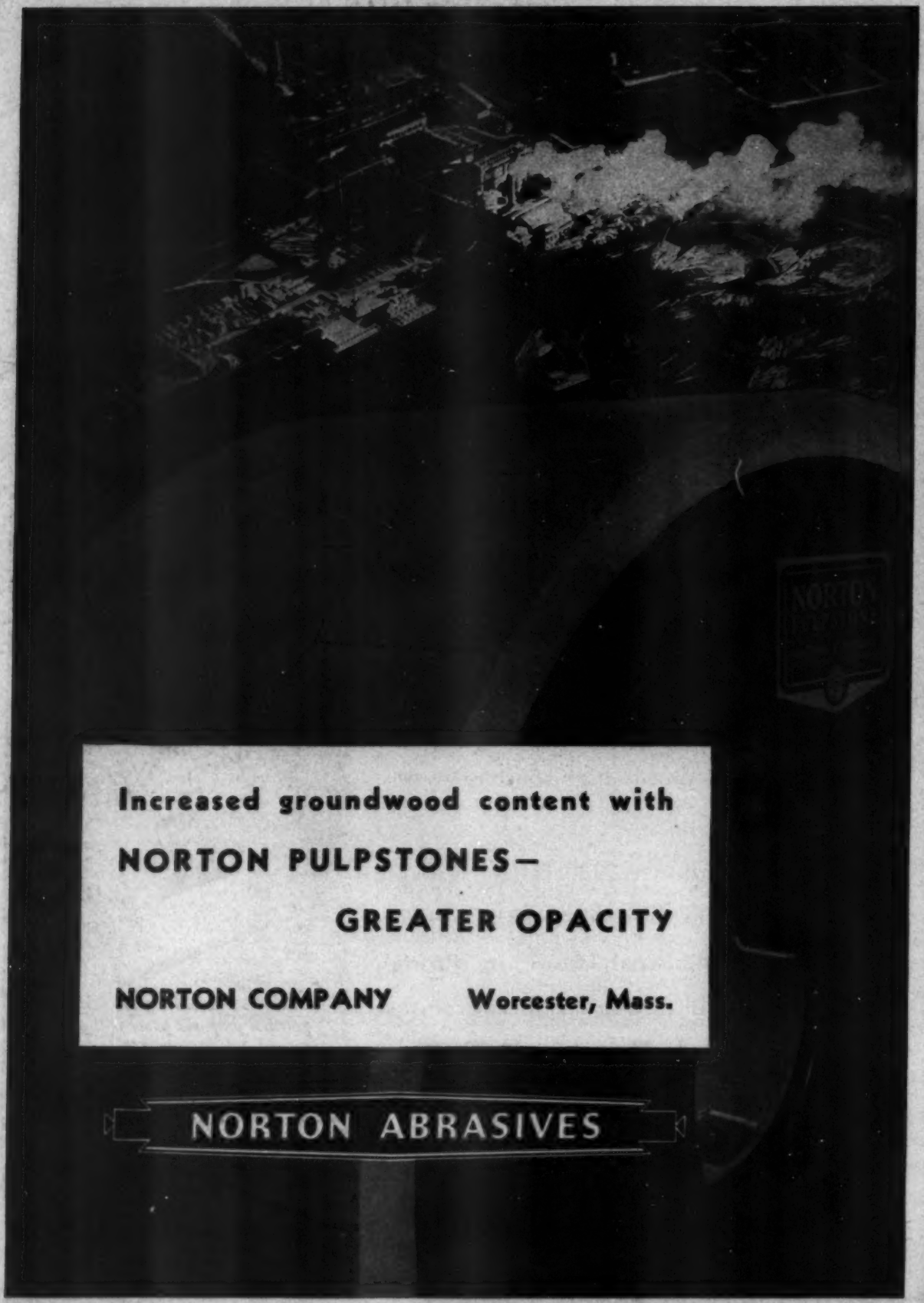
FROM the first application, smooth, quite operation of gearing proves that Texaco Crater is at work reducing wear. For Texaco Crater is no ordinary lubricant. It cushions gear teeth.

Spreading over the surface of each tooth, Crater "follows through," protecting every gear tooth in the train. And Texaco Crater c-l-i-n-g-s despite peripheral speeds, high tooth pressures, and temperatures.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Industrial Lubricants. Prompt deliveries assured through 2108 warehouse plants throughout the United States. The Texas Company, 135 East 42nd Street, New York City.

2 FREE BOOKLETS. *40-page booklet for the practical pulp and paper mill operator—treats lubrication problems throughout entire process. 32-page booklet—money-saving information on where and how to use Texaco Crater. Write or ask for your copy, today!*

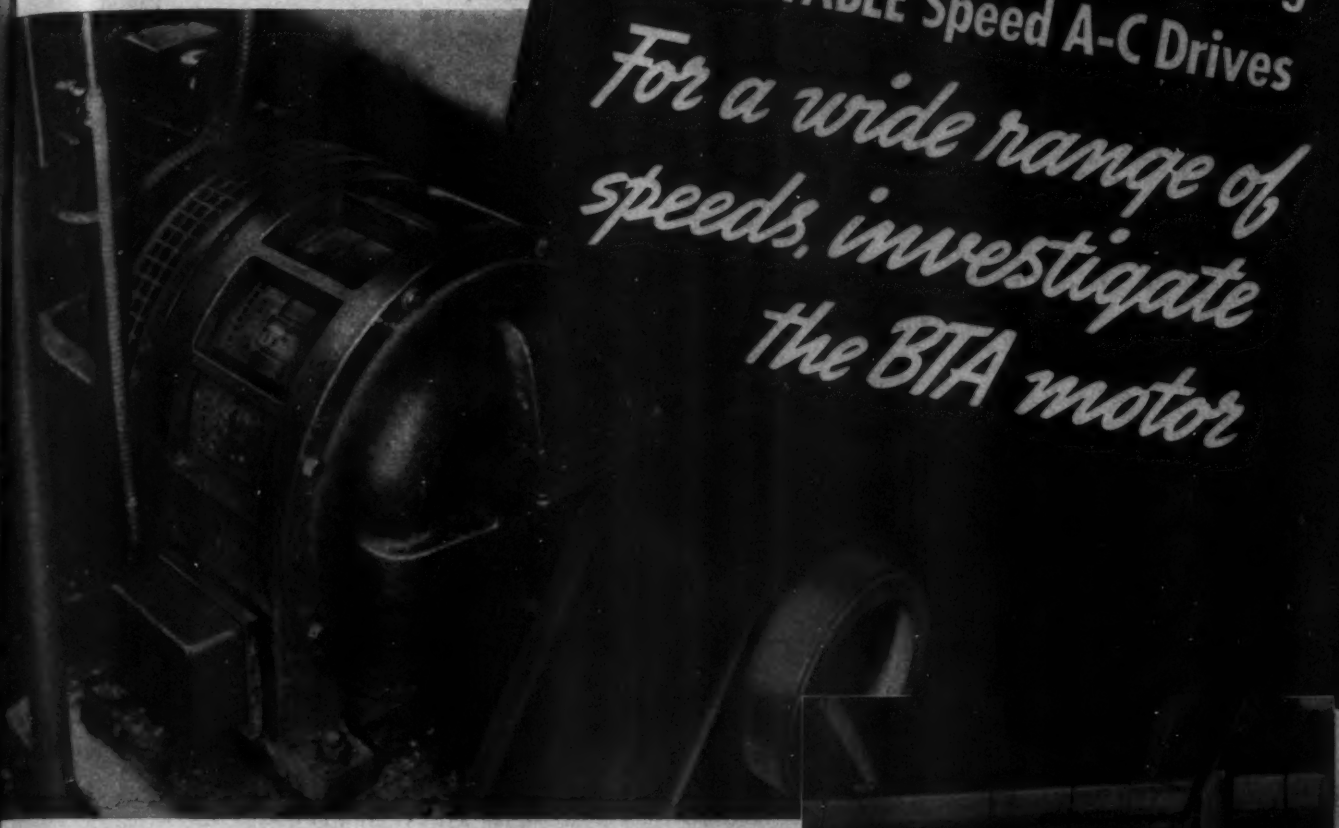
CRATER


Increased groundwood content with
NORTON PULPSTONES—
GREATER OPACITY
NORTON COMPANY Worcester, Mass.
NORTON ABRASIVES

Hammond Bag & Paper Co. Mill, Wellsburg, W. Va. Replacing a constant-speed motor driving the wet end of a paper machine, this BTA motor has repaid its cost many times. Its application has improved the tensile strength and grade of paper.

To Mill Operators Seeking ADJUSTABLE Speed A-C Drives

For a wide range of speeds, investigate the BTA motor



WHERE you want a variety of speed changes without installing d-c drives, gear-train arrangements, or belt-changing devices, the answer may well be one of General Electric's Type BTA motors.

For example: At the Hammond Bag & Paper Co. plant a BTA motor replaced a constant-speed-motor drive on the speed of which the grade of paper produced depended. Since it was installed, the BTA motor, with its wide and easily adjusted speed range, has helped improve not only the grade, but also the tear and tensile strength, of the paper.

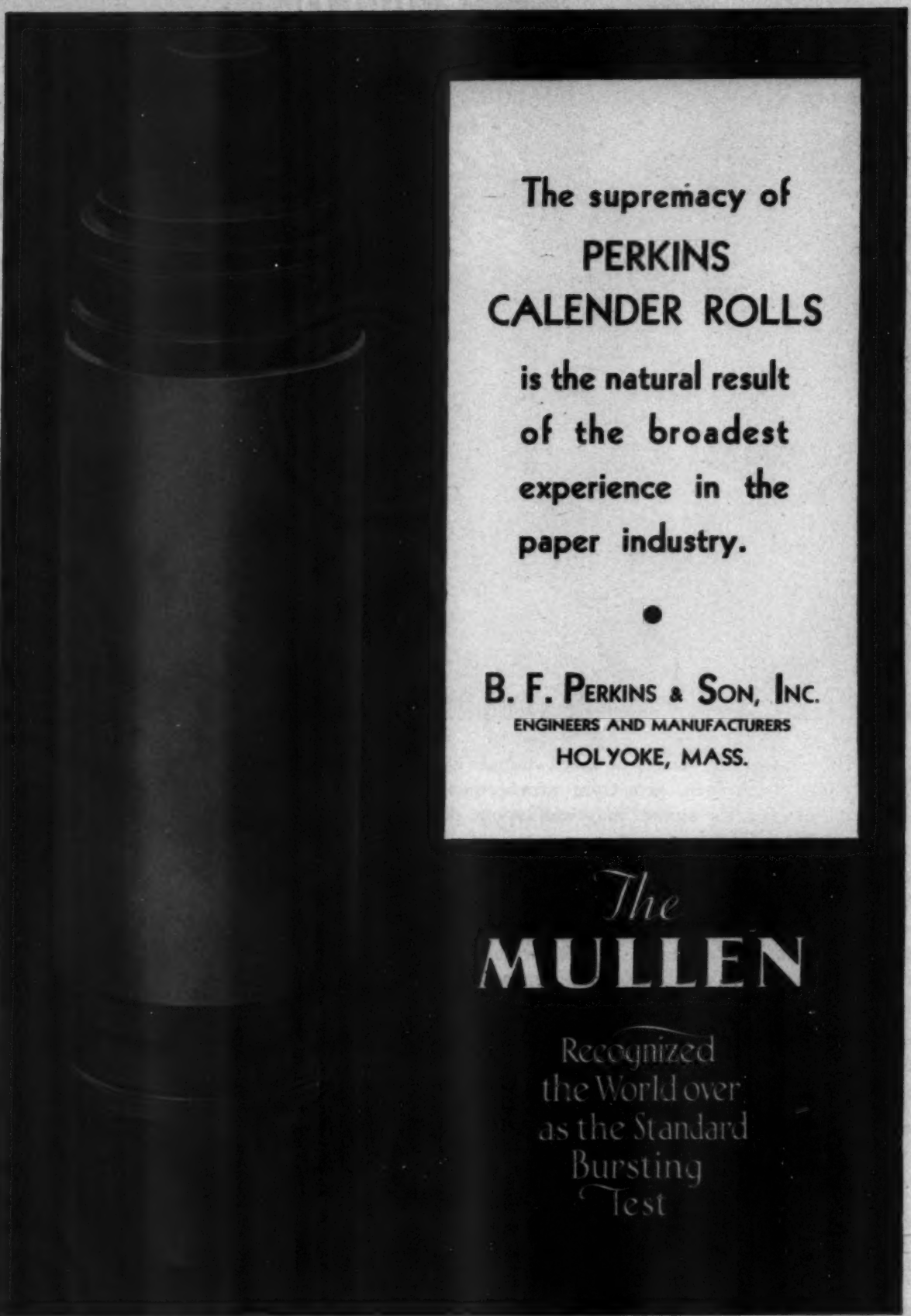
Especially applicable to various processes in the paper industry, this motor has great mechanical and electrical stability. It is not difficult to install.

By reason of its design and construction, it costs more than a general-purpose motor. But it has well repaid the investment in numerous installations.

For information on the application of a BTA motor in your mill, inquire of the nearest G-E office or write to General Electric Company, Dept. 6—201, Schenectady, New York.

BTA motor driving Coty bag bottomer provides widely adjustable speeds for fast, medium, or slow runs

GENERAL ELECTRIC


The supremacy of
PERKINS
CALENDER ROLLS
is the natural result
of the broadest
experience in the
paper industry.
B. F. PERKINS & SON, INC.
ENGINEERS AND MANUFACTURERS
HOLYOKE, MASS.
The
MULLEN
Recognized
the World over
as the Standard
Bursting
Test

"The Harvest" by Leon L'Hermitte—Reproduced by Courtesy of Washington University, St. Louis, Missouri

"Today's Seed is Tomorrow's Harvest"

THE PUSEY AND JONES CORPORATION, WILMINGTON, DELAWARE

"You Just Can't Count On a DEAD Dryer Felt!"

"That asbestos felt of yours," a paper-mill superintendent told us not long ago, "has mighty little stretch. But I'm glad the fabric itself has some 'give' to it—because you just can't *count* on a DEAD dryer felt.

"For instance, there's always a chance, as you know, of a wad sticking in the dryers—and, in such a case, even a *new* dryer felt that's DEAD may break.

"Then, again, when a new seam has to be taken, you're up against it for cloth to make the seam, unless you have a little 'give' in the felt fabric. And you know what it means when a roll has to be removed."

There are many other advantages offered by the firm, all-woven construction of the HOOPERWOOD Asbestos Felt as opposed to a *pre-stretched DEAD* felt with a *built-up* surface of sizing. The all-woven cloth has greater resistance to wear, does not glaze, hugs the rolls snugly and evenly—and insures greater all-round uniformity and dependability in drying.

If your present dryer felts are costing too much per ton of production, we will welcome an opportunity to discuss the problem with you and to help you choose the particular Hooperwood felt which will best meet your own operating conditions.

WM. E. HOOPER & SONS COMPANY

General Offices: Juniper and Cherry Sts., Philadelphia · 320 Broadway, New York City · 300 W. Adams St., Chicago, Ill.

Selling Agents: GENE BECHARD, Atlanta, Ga. · HARRY W. STRATTON, Portsmouth, N.H. · M. E. AVERY CO., Watertown, N.Y. · DANE CHARLES, Seattle, Wash.

HOOPERWOOD ASBESTOS AND COTTON DRYER FELTS

Dilts

Announcing

COWLES VERTICAL CLASSIFINER

What every board mill has been waiting for. A new vertical screen for paper machine screening, developed and built by Dilts. Compact—efficient—economical.

ECONOMY

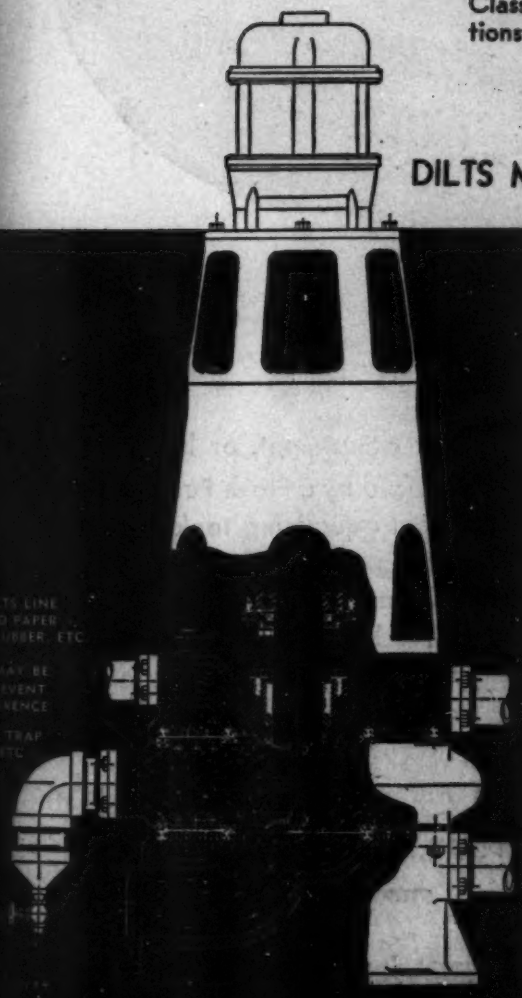
A saving of 75% in floor space can be effected with this new vertical screen. Operates at relatively low speed, thus reducing wear, maintenance and power.

EFFICIENCY

The impellor design makes for an efficient centrifuging action. A seven month period in a leading board mill, under strict observance, has proved the efficiency and economy of this new vertical Classifiner. It promises to be as outstanding in performance as the original Cowles Classifiner, of which there have been more than 30 installations over a period of 3 years.

Dilts engineers will be glad to consult with you on your individual requirements. Write for details.

DILTS MACHINE WORKS, INC. FULTON, N. Y.

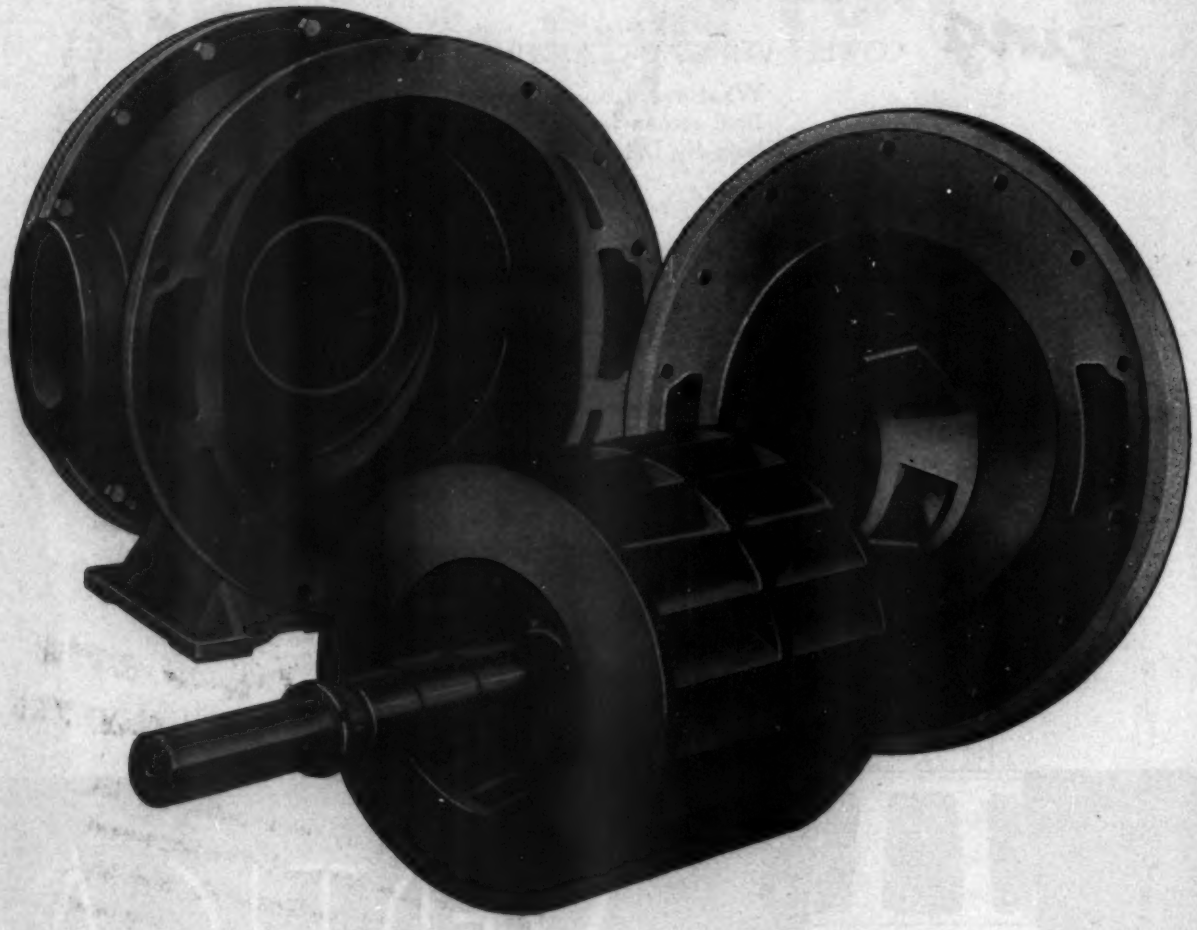


VERTICAL SCREENING

COWLES VERTICAL CLASSIFINER
Built by
DILTS MACHINE WORKS, INC.
FULTON, N. Y.

SIMPLICITY!

NASH VACUUM PUMPS HAVE ONE MOVING PART.



Operating advantages made possible by the Nash principle, and present in no other type of vacuum pump, permit a new level of operating economy. Nash Vacuum Pumps have but one moving part, a rotor cast in one piece, and revolving without metallic contact. There are no valves, no pistons or sliding vanes, no internal parts requiring wear adjustment, or lubrication.

Vacuum produced by a Nash Pump is non-pulsating without equalizing tanks. Liquid entering the pump does no harm, even in slugs. Reliability and durability are inherent in the simple Nash construction, and these qualities are assured by superior material and workmanship.

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

FIG. 102
BRONZE GLOBE
VALVE.

FIG. 375
BRONZE GATE
VALVE.

FIG. 150
BRONZE GLOBE
VALVE.

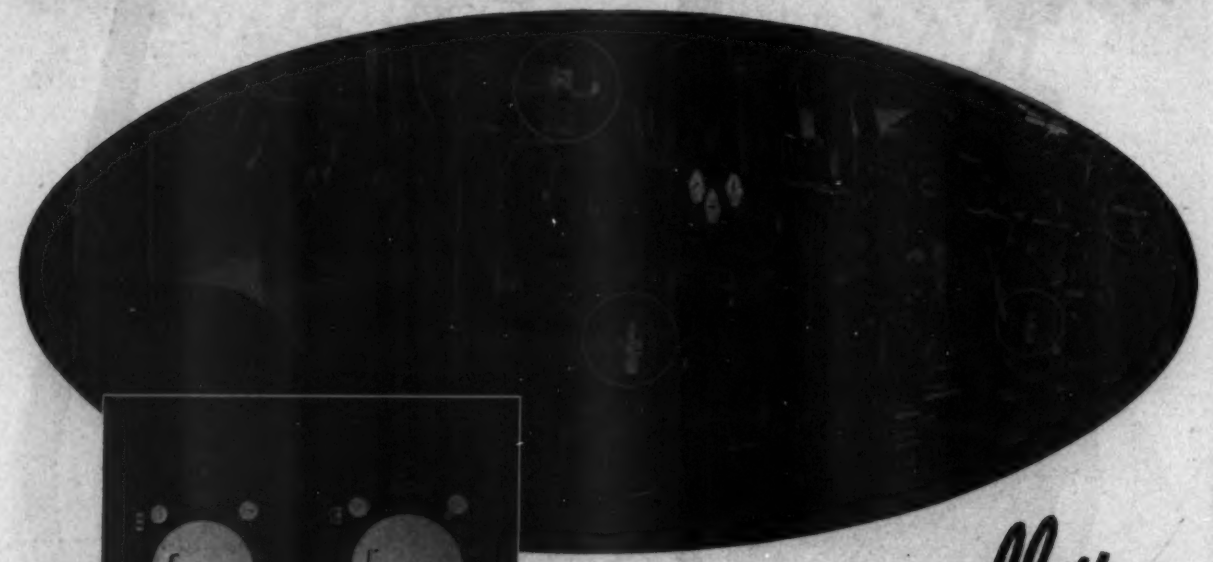
REPLACE WITH POWELL BRONZE VALVES

Be sure of dependable service in your next valve replacement. Careful workmanship and high grade materials have long been the engineer's first choice over all others. For unusual service demands and minimum upkeep demand Powell Bronze Valves.

POWELL VALVES

THE WM. POWELL CO. CINCINNATI, OHIO

MODERNIZE DRYING CONTROL



Economically

Modernizing drying controls is a paying investment—a fact that has been proved time and again. Scores of mills have effected economies through automatic operation, increased capacity, more uniform sheet and elimination of steam losses. Modernizing pays for itself in a minimum period when Tenso-Temp Control is installed because this Masoneilan control was designed and built for maximum economy—

- **Economy in low first cost—low installation cost—low operating and maintenance cost.**
- **Economy in a minimum of new equipment and a minimum of change-over in present equipment.**
- **Economy through instantaneous shut-off of steam when sheet breaks and in holding dryer temperature gradient while taking the sheet over.**
- **Economy in adaptability of Tenso-Temp to all grades of paper.**

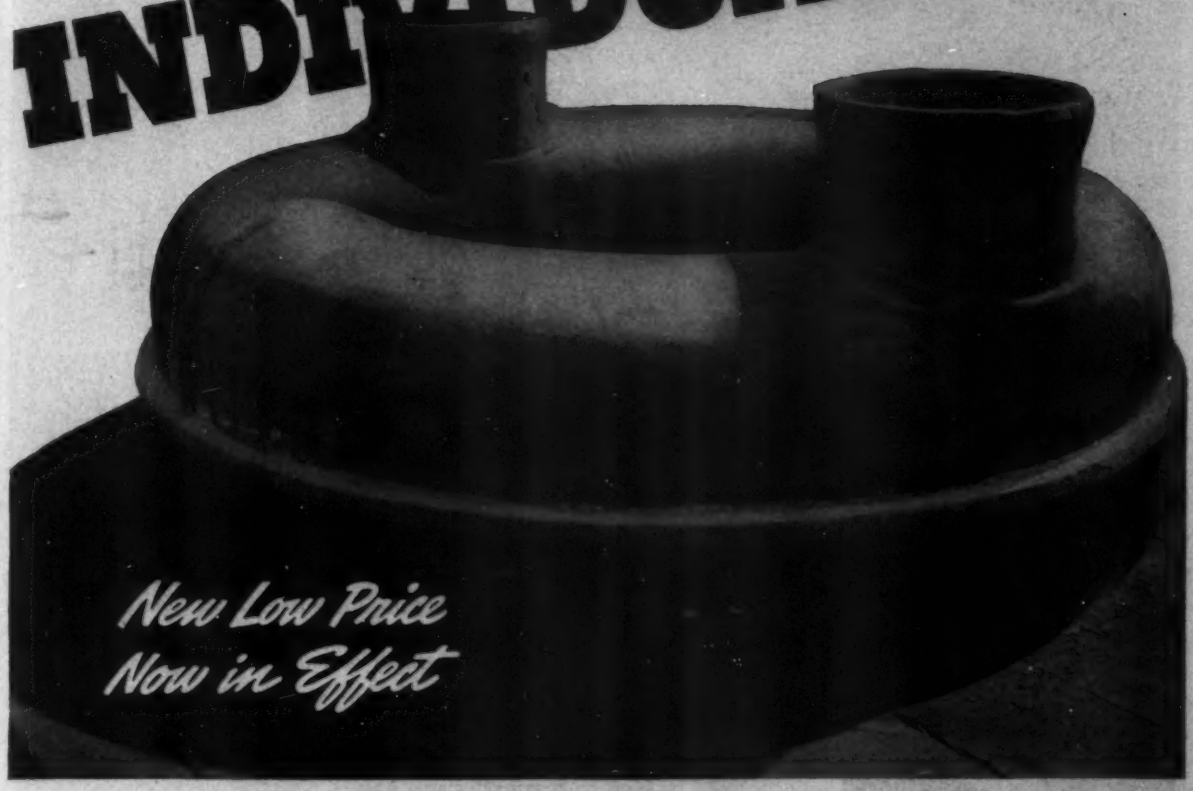
MODERNIZE WITH

Tenso-Temp economy will build profits for you as it has for others. See how inexpensively you can improve your drying operations—write for Bulletin No. PD-1.

MASONEILAN **1196 ADAMS STREET, BOSTON, MASS., U. S. A.**

New York Philadelphia Pittsburgh Chicago St. Louis Tulsa Houston Los Angeles

THIS LEAD IS A RUGGED INDIVIDUALIST



RUGGED? Yes, very! Tellurium Lead is not only tough to begin with—it develops increased toughness under stress. *It work-hardens.* When rolled, stretched or hammered, it actually becomes stronger. As a result, turn-over points and joints are less subject to cracking.

Furthermore, where vibration occurs, this capacity to develop latent strength minimizes buckling and creeping. This same quality also gives Tellurium Lead improved resistance to fracture due to repeated heat changes.

INDIVIDUALIST? That word also describes Tellurium Lead. One outstanding point of individuality is its high resistance to corrosive acids. Even at temperatures that tend to approach the melting point of the metal, this lead shows unusual ability to withstand the attacks of sulphuric and numerous other destructive acids. In plant after plant, it has prolonged the life of equipment . . . and reduced the number of shutdowns for repairs.

Tellurium Lead of our manufacture is St. Joe chemical lead alloyed with a small quantity of tellurium. It gives the advantages of this time-tried chemical lead plus important new ones. Yet now, due to a price reduction, it costs only a fraction of a cent more per pound than chemical lead. Tellurium Lead is available in sheets, pipe and coils. For further facts, write to nearest branch.

Typical User Reports

"I wish to say that your Tellurium Lead pipe has proved all you claimed. It is easy to weld and easy to flange. Also the flanges stand up a good deal better than ordinary lead as they seem to actually become stronger at the turn-over point."

Another company writes: "Our coils are used in a dilute sulphuric acid solution. The lead coils previously installed gave comparatively short service (about 6 months). Tellurium Lead coils have been operating continuously 24 hours a day for one year and as yet no blow-outs have occurred. No repairs have been necessary."

NATIONAL LEAD COMPANY

New York, Baltimore, Buffalo, Chicago, Cleveland, Cincinnati, St. Louis; National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co., Pittsburgh; Georgia Lead Works, Atlanta; Gibson & Price Co., Cleveland; American Lead Corporation, Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Company, Ltd., Toronto, Montreal, Winnipeg, Vancouver.

Tellurium Lead

Paper Manufacturers know they can

DEPEND ON SKF

BUILT BY THE PUSEY & JONES CORP. SKF-EQUIPPED

● SKF *makes more types and sizes of ball and roller bearings than any other manufacturer in the world.*

For many years leading manufacturers of paper machinery have depended upon the stamina, reliability and precision of SKF Bearings for the smooth performance of rotating parts.

Pusey & Jones are no exception, for they were quick to recognize the advantages of the SKF Dryer Cylinder Mounting that permits *free cylinder expansion* and *contraction* with *no thrust loads* on bearings or side frames.

Almost every large mill in this country and abroad selects SKF for the very definite reason that manufacturers and users alike can depend upon them. 4094

SKF

BALL AND ROLLER BEARINGS

to produce paper like this *Cheaply*

The problems of the manufacturers of homely "tar paper," "rosin sized sheeting" and slaters' felts differ in degree but not in kind from those of the makers of the finest bonds, ledgers and book papers. However different the formulae for the furnishes, the task of removing the excess water uniformly and rapidly is common to all branches of the paper industry. Because they do this work at lowest cost, at highest speeds and with fewest stops, Hamilton Felts are standard equipment for the paper machines of the leading manufacturers of building papers.

From the thinnest tissue to the heaviest boards there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills, Established 1858 •

Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

Hamilton Felts

IT'S IN THE BAG

A fine white powder flows from the hopper . . . down through modern packaging machinery . . . on into a sturdy container. Operator Sargent Griffin pulls a lever . . . and another bag of Mathieson Soda Ash starts on its way to American Industry.

●

WHETHER the soda ash you buy represents a major raw material purchase or is merely incidental, you use care in selecting your source of supply. First, of course, you ask the natural questions about quality, price and delivery. But you also want to know something about the company with which you are to deal—its policies, its resources, its facilities for rendering service.

"Mathieson Chemicals" is a 36-page booklet designed to furnish you with usable buying information and to give you an opportunity to examine the background of the Mathieson organization. It contains a brief history of the company, concise product and package specifications, flow charts, plant photographs and other interesting material.

If you would like to have a copy of this booklet, just write to The Mathieson Alkali Works (Inc.), 60 East 42nd Street, New York, N. Y.

MATHIESON CHEMICALS

SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER
HTH AND HTH-15 . . . AMMONIA ANHYDROUS AND AQUA . . . PH-PLUS (FUSED ALKALI) . . . SULPHUR CHLORIDE
CCH (INDUSTRIAL HYPOCHLORITE) . . . DRY ICE (CARBON DIOXIDE ICE) . . . ANALYTICAL SODIUM CHLORITE

Spring Time in the Paper Industry

THE general volume of business in these United States is not expanding at any such rate as would cause anyone to write home about. However, it is expanding slowly and continuously.

In March, the general business volume went up from 56.9 per cent to 58.1 per cent, a gain of 1.2 points for the month. In April, it advanced from 58.1 per cent to 59.3 per cent, another gain of 1.2 points—a total for the two months of 2.4 points. Not much, you say, and yet, it is a lot.

If, for comparison's sake, the weather bureau announced that the water level of Lake Michigan rose in sixty days 2.4 inches, that would be a lot of water because Lake Michigan is some 400 miles long and 75 miles wide, and a 2.4 inch rise over that vast area means a lot of water. Similarly, a 2.4 point rise in the entire business volume of the United States in sixty days is a lot of business volume in these halcyon days of the Roosevelt depression. And for one thing, it does confirm the fact that the low point has been reached and passed and further continued advances may reasonably be expected in the future, all of which, of course, is subject to the provision that the Great White Father in Washington will refrain from throwing any more political monkey wrenches into the economic and industrial machinery.

So much for the general volume of business expansion.

There is, however, a development within the past sixty days that is well worth the careful notice of every paper man and that is the continued, rapid expansion of paper consumption, when compared to the general business volume. For instance, at the end of March, when the volume of general business stood at 58.1 per cent of the 1926 volume, the per cent of potential capacity production in the kraft paper division was 64.8 per cent, showing a 6.7 points greater mill operation volume than the volume of general business.

At the end of April, when the general volume of business stood at 59.3 per cent, the mill operation ratio had advanced to 70.4, or 11.1 points difference or a gain in thirty days of 4.4 points.

Now, these figures are particularly enlightening when it is remembered that the kraft paper potential tonnage was advanced from 1,281,480 tons annually to 1,493,752 tons for the current year, and here, on the last of April at the bottom of the second depression when the volume of general business in the United States is only 11 points above the all time low business volume of 1933, the kraft paper consumption is showing a steady, continuous increase far in excess of the general business volume increase—an unprecedented situation of tremendous import to the paper industry.

The natural question is—what is causing this unprecedented increase in paper consumption? The only answer is that paper and pulp mill products are being used in constantly increasing quantities in more and more divisions of general industry to supplant other raw materials formerly used. And one substantial reason for that condition is that this is a cellulose age—and cellulose is a low-cost general utility raw material of industry.

+ EDITORIAL +

A Broadened Editorial Scope

THE first issue of *The Paper Industry* made its appearance in April, 1919, not as the result of chance, but as the fruition of a long felt need on the part of many of the industry's constructive thinkers for an educational journal.

There had been a rather rapid expansion of productive capacity in the industry. The depletion of forest resources and the need for proper forest management was becoming a big issue. Engineering advancement in process and auxiliary equipment and in mill design was being made. Technical control was gaining a foothold. All in all, changes were being made which were so widespread that it was difficult, if even possible, for the most gifted individual to follow them as completely as was desirable.

Management officials, operating executives, engineers, chemists and technologists were groping for a means of keeping informed as to progress of the industry and of self-expression. *The Paper Industry* has proved to be that means. For nineteen years it has been recording the progress of the industry through its informative educational articles. These articles, when considered as a whole, include the vast experience of a great many of the best known and most progressive personalities of the industry. They also present to all who desire to use them a veritable encyclopaedia of information on operating practices within the industry.

The most prophetic of 1919 could hardly have visioned the changes which have come about in the industry during the succeeding nineteen years. There has been an increase in productive capacity that would startle the papermaker of only a generation or two ago. The wide expansion of the sulphate industry for the most part came unheralded. With it came a regional shifting of mills. There also have been continual improvements in equipment design and advances in technology that have been so outstanding that they are little short of marvelous.

Believing that the industry's achievements of the past are but stepping stones to its progress in the future, *Paper World*, the pictorial newsmagazine which was started in March, 1937, to satisfy another demand for current material which constantly emanates from the industry, is being combined with *The Paper Industry* beginning with the June issue. This consolidation brings within the covers of one magazine the illustrated news of *Paper World* and the enlightening educational articles of *The Paper Industry*. In keeping with this consolidation, the combined magazine is to be known as "*The Paper Industry* and *Paper World*".

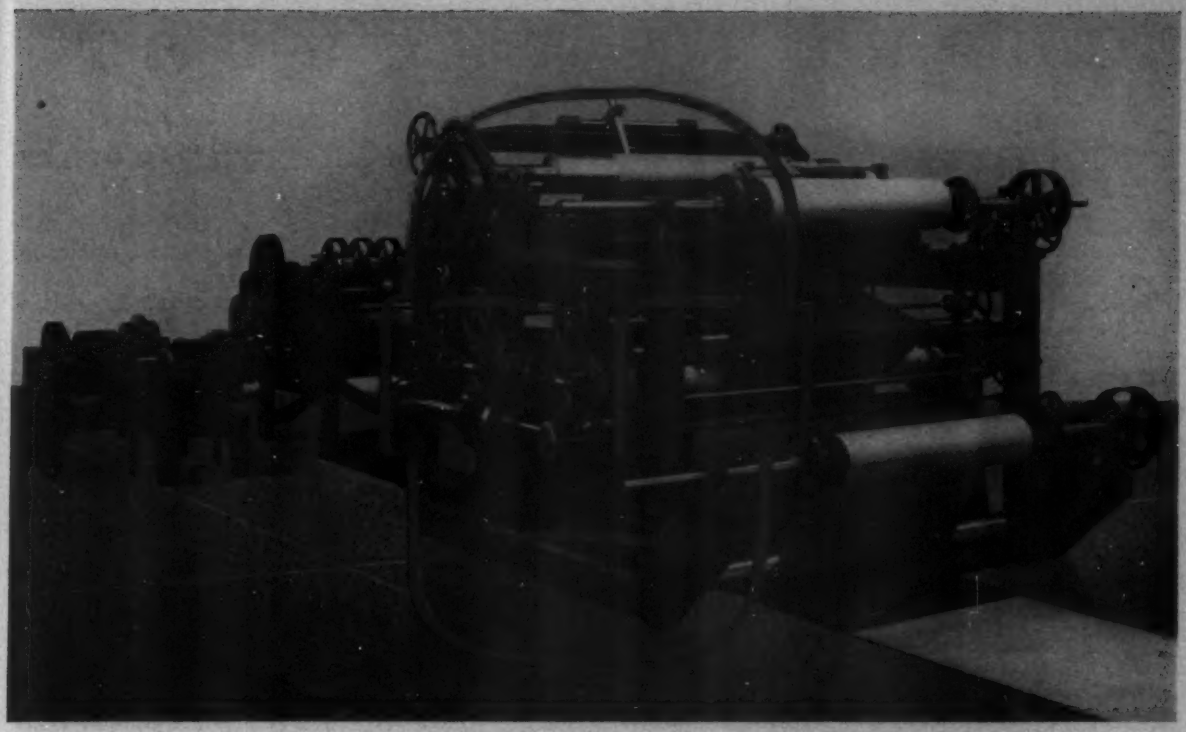
The Superintendents Convention

IN ONLY another few weeks, June 22-24 to be exact, the American Pulp and Paper Mill Superintendents Association is to meet in annual convention. For the first time in the history of the organization, the meeting is to be held outside of the United States. Toronto, Ontario, is to be the host city and the Royal York Hotel, reputed to be the largest hotel in the British Empire, the convention headquarters.

If early announcements are to be any criteria of the quality of the convention, it is going to be an outstanding one. Provision seems to have been made to satisfy the interests of every one. Recognition most certainly has been given to the old adage that "All work and no play makes Jack a dull boy" because the program, in addition to its formal sessions, includes some entertainment features that should prove most pleasing.

The selection of Toronto as the convention city is particularly interesting. It indicates rather definitely the widening influence of the American Pulp and Paper Mill Superintendents Association. It also indicates tangibly the spirit of close fellowship that exists between operating executives on both sides of the border.

If you are an operating executive in the pulp and paper industry or an individual interested in the welfare of the American Pulp and Paper Mill Superintendents Association, arrange to attend this convention, the 19th annual convention of the Association, if your activities will permit you to do so. You will find it to be worthwhile.



It Thinks . . .

Smith & Winchester engineers adapted the photo-electric cell (electric eye) to S & W's improved straight line Paper Bag Tuber. Result: seam variations are held to 1/16″ plus or minus, regardless of unevenly wound or badly dished rolls.

From previously printed rolls the printing variations are held to 1/8″.

And the speed is 600 feet a minute, or more.

Without increasing the number of machines you have in use, or your space, *or* your man power—you can make production leap ahead by replacing present machines with this new development.

Complete data and quotations on S & W Paper Bag Tubers and Bottomers will be sent to you without obligation. Have your secretary drop us a note asking for it.

Also write for information on Envelope Cylinder and Box machines

The SMITH & WINCHESTER *Manufacturing Company*

1828

ONE HUNDRED AND TEN YEARS OF ADVANCEMENT

PLANT AND OFFICES AT SOUTH WINDHAM, CONN.

Potpourri . . . . . .

WILLIAM SIBLEY

◆A GOOD MANY YEARS AGO John Wallace, a very fine man, started a farm paper, out in Des Moines, Iowa. He called it *Wallace's Farmer*. The periodical reflected the character of its publisher and became a very fine paper. Through his paper John contributed much to mid-western agriculture, made a lot of friends and a lot of money. When his grandson, Henry, inherited the property the editorial policy of the paper was changed. By news stories and editorials *Wallace's Farmer* hammered away constantly at the theory of suppression, restriction and limitation. Rapidly the paper lost its influence, many of its subscribers, and most of its advertisers. It became a losing property and was finally sold to a man named Pearce. But Henry Wallace sold himself into a berth at Washington and instituted the late and unlamented "AAA." But even though the Supreme Court stepped on his AAA, the theories of restriction and limitation still persist. And gentlemen—we will presently witness an upheaval of aroused opposition among the farmers of this country that will make the current industrial opposition to the New Deal look like a few ripples in a fish-pond.

◆MR. FORD, the man who probably has done more for labor than any other single individual in American history, has seen and talked with the President. Personally, I believe Mr. Ford is right in his insistence that the American people don't want "security"—they want "opportunity." If Washington will just let us alone we'll make both social and economic progress—rapidly.

◆OVER IN EUROPE there is a war impending. And when it comes it is going to be a honey. No kidding. So devastating will it be that even now England and France are pooling their war purchases and have agreed that, in the event of war, a French general will be given unified command of the armies and an English admiral the command of both fleets. When nations even as sensible as England and France take such steps, war isn't far distant. And listen: half of the money you sent to the Collector of Internal Revenue, plus half of all the checks sent in by all your income-tax-paying-brothers, all added together, won't be enough to pay for this year's share of the cost of the last war!

◆PHIL LA FOLLETTE has recently started a new political party—the "National Progressives of America." After reading some of the things he stated as being basic planks in the platform of that party, we trust Phil will be as successful in the forthcoming election as his father "Bob" was when he ran against Coolidge in 1924. He carried only one state at that time, if you recall.

◆SOMETIMES THE SENATORS GET ME DOWN. Here's Senator Sherman Minton, Democrat from Indiana, introducing a press censorship bill which provides imprisonment of not more than two years, a fine of from one to ten thousand dollars, and suspension of publication for six months for any publisher of a newspaper or a magazine that "prints anything known to be untrue." Now there's a poser. What is to be the method of determining whether the material published was untrue? Senator Minton fails to specify. I'll bet that bill wasn't framed by a newspaper man or a magazine publisher. Not a very good one, anyway. Everything that is published must first be written, and what is written is the expressed judgment of the writer. And judgment—is—opinion. And opinions differ. A Republican paper headlines: "Democrats Rage in Wild Session" whereas a Democratic paper headlines: "Democrats Pass Harmony Vote." Both papers are honestly reporting the facts as they see them, the difference being born of personal opinion. When Senator Guggenslocker introduces a bill to tax paper mills we would report the fact and fight it because that is our province in life. And if Senator Minton wants us to see the thing through his eyes, well then—maybe we'll tell how Senator Guggenslocker exercises his old hobby of eating spaghetti while standing on his head in the bath tub. And that wouldn't do Guggenslocker any good but it yet would be the truth . . . Maybe this press censorship bill is a crystallization of Senator Minton's bitterness over being cartooned and editorialized in a way that associates him with the Soviet ogpu and the Nazi gestapo. . . . Well, President Roosevelt has signed an executive order authorizing the Minton senate committee to examine the income tax returns of any administration opponents who happen to be under investigation.

◆HARRY HOPKINS, I believe, is one of those largely in charge of the Washington administration of the WPA. His General Order No. 36 reads: "In all cases where a WPA official or employee is requested to testify in regard to matters of official or confidential character, knowledge of which was acquired in his official capacity, he shall respectfully decline to answer. If his reasons are requested by the court he shall courteously state that the matter is privileged and cannot be disclosed without approval from the administration." . . . Sometimes it doesn't take a constitutional amendment to kill the effectiveness of our courts.

◆DO YOU KNOW THE DIFFERENCE between an optimist and a pessimist? The former is a man who might say: "Gee Whiz. Business is getting so lousy we'll all be out on the street begging pretty soon"—while the latter is the man who replies: "From whom?"

Your POWER TRANSMISSION *Worries are Over* —

WHEN YOU INSTALL LINK-BELT *Silverstreak* SILENT CHAIN DRIVES . . . .

ADVANTAGES OVER BELTS OR ENDLESS ROPES

—equal or lower first cost in many instances.

—no dismantling of machine or removal of sheaves or pulleys to make repairs.

—no "machine down" time as when renewing "endless" belts.

—positive action assures full productive capacity of the machine.

—easy to install...just connect the ends of the chain.

—safety to employees...operate in oil-retaining casing.

—require practically no attention or upkeep.

—give up to 25 years' service and longer.

Send for 96-page engineering Data Book No. 125. It shows how to figure drives and determine prices.

LINK-BELT COMPANY

Indianapolis Chicago Philadelphia Atlanta
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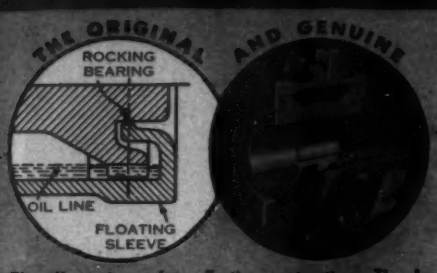
LINK-BELT POSITIVE DRIVES INCLUDE

LINK-BELT *Silverstreak* SILENT CHAIN DRIVES

WEST COAST HEMLOCK PULP
PULP DIVISION ‡ WEYERHAEUSER TIMBER COMPANY

THE SUPERIORITY SHOWS UP IN PERFORMANCE



The illustrations show Fast's construction. The load-carrying surfaces are protected from wear by a positive film of oil. This oil is kept permanently clean by the rocking bearings which make precise metal-to-metal contact and are in the one position where they form permanent dust and moisture proof seals. These vital features are found only in genuine Fast's Self-Aligning Couplings.

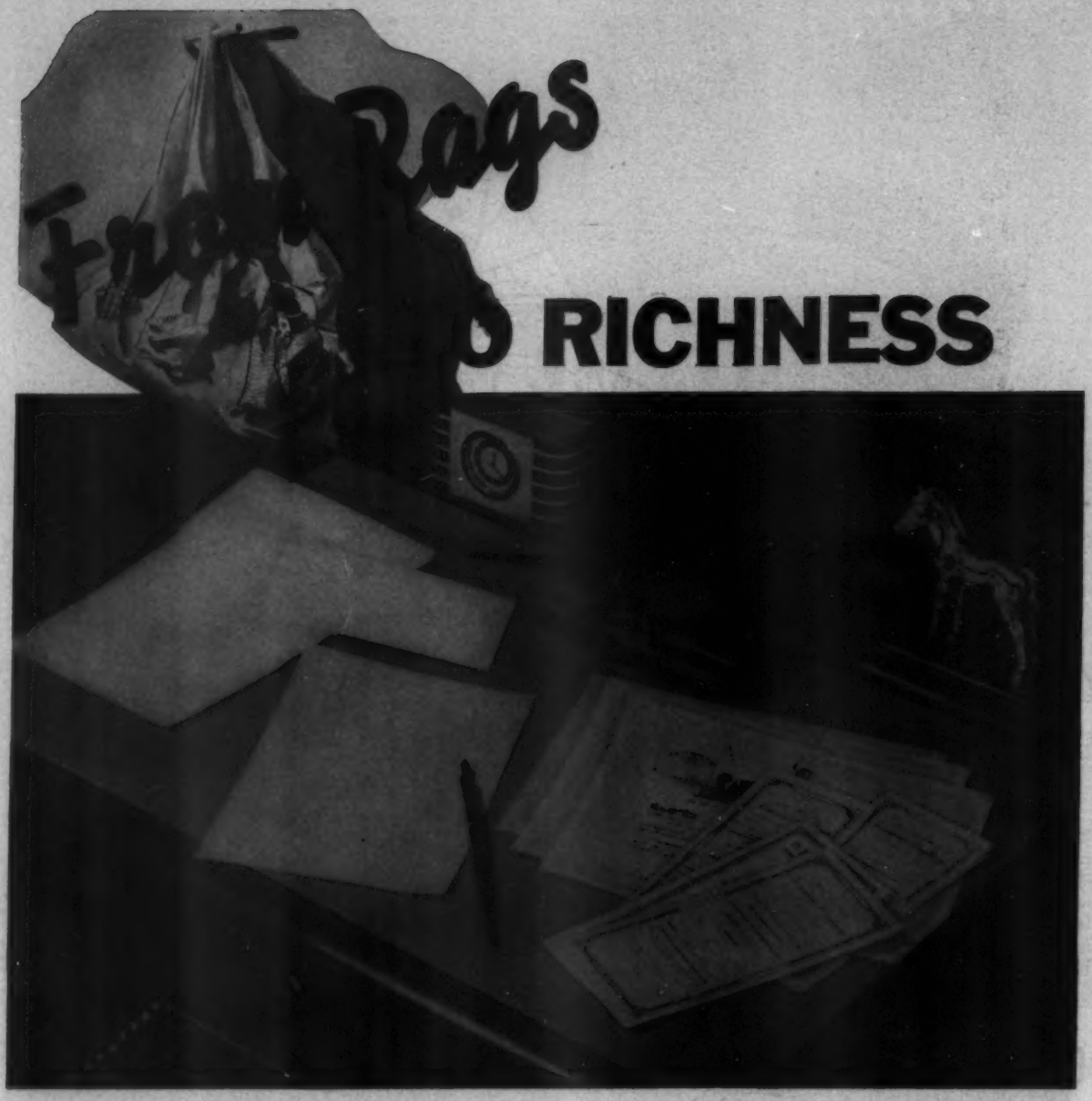
NO FAST'S COUPLING WAS EVER OBSOLETE

The scrap-heaps of the world are fed with obsolete machines and equipment . . . but you'll find no Fast's Self-Aligning Couplings among them. The engineering principles upon which the original and genuine Fast's Couplings were developed still stand unquestioned and unchallenged. Fast's design still defies improvement, demands no attention but an occasional oiling.

Fast's Self-Aligning Couplings, through a combination of exclusive advantages, offer a proven dependability and endurance, have solved countless coupling problems. Fast's can solve yours. The Superiority shows up in Performance—as you'll find when you specify "Fast's." Koppers Company, BARTLETT HAYWARD DIVISION, BALTIMORE, MARYLAND.

FAST'S COUPLINGS

KOPPERS product



What a lot of Quality a little "TI-PURE" LW *produces!*

EVER consider that papers and race horses have something in common? Both may come from the finest stock...but it's their *finishes* that count!

It's to produce the finest possible finish for fine paper stock that Krebs has developed "Ti-Pure" LW. This outstanding pigment produces a maximum of whiteness, brightness and opacity...without lessening the strength of the paper or impairing its other high qualities.

The base of "Ti-Pure" LW is commercially pure titanium dioxide. It contains only traces of moisture, and soluble and insoluble salts. Iron content is extremely low, and there is no sulphide sulphur. "Ti-Pure" LW disperses easily in water... spreads evenly through the paper web... and wastes far less paper through blotching or mottling.

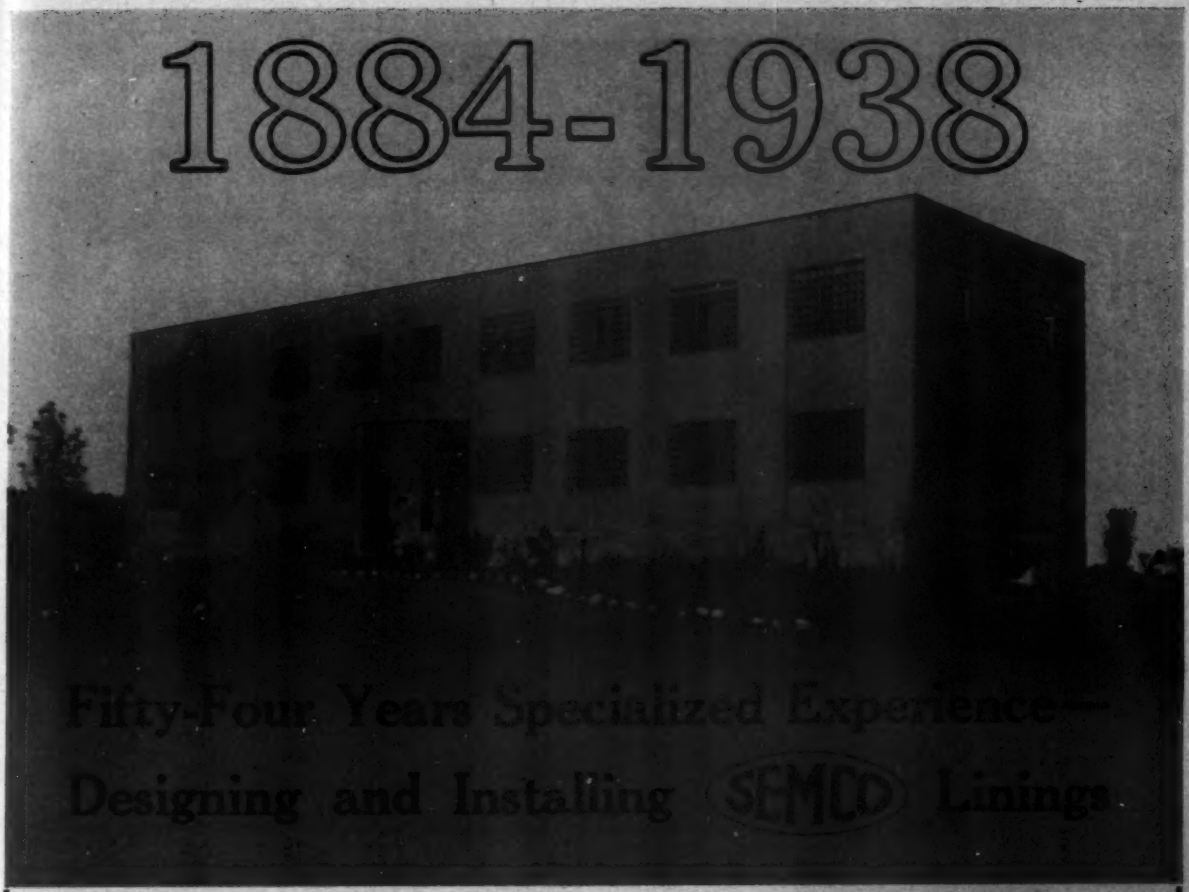
Write for more detailed information on the remarkable character and profitable application of "Ti-Pure" LW, and you will receive a prompt reply.

KREBS

PIGMENTS FOR PAPER

KREBS PIGMENT & COLOR CORP.
1007 ORANGE STREET
WILMINGTON, DELAWARE

1884-1938



Fifty-Four Years Specialized Experience—
Designing and Installing SEMCO Linings

CORROSION-RESISTING LININGS FOR

Acid Accumulators
Acid Tanks
Acid Towers
Beaters
Bleaching Tanks
Blow Pits
Chests
Chlorinators
Combustion Chambers
Digesters
Towers
Washers

Many individual elements have combined to develop the unequalled reputation which Stebbins Acid-Resisting Linings for pulp and paper mill vessels have enjoyed for over half a century. Sound mechanical design — chemically correct ceramic materials and bonding cements — superior workmanship — all contribute their essential parts.

Materials and men are always available at strategic points, ready to get on the job — practically at a moment's notice — whether the work be a new lining installation, a relining or a repair.

All Stebbins Linings carry a definite guarantee of satisfactory service which they invariably outlive. Let us demonstrate the superiority of Stebbins Linings and service the next time you line a new vessel or reline an old one.

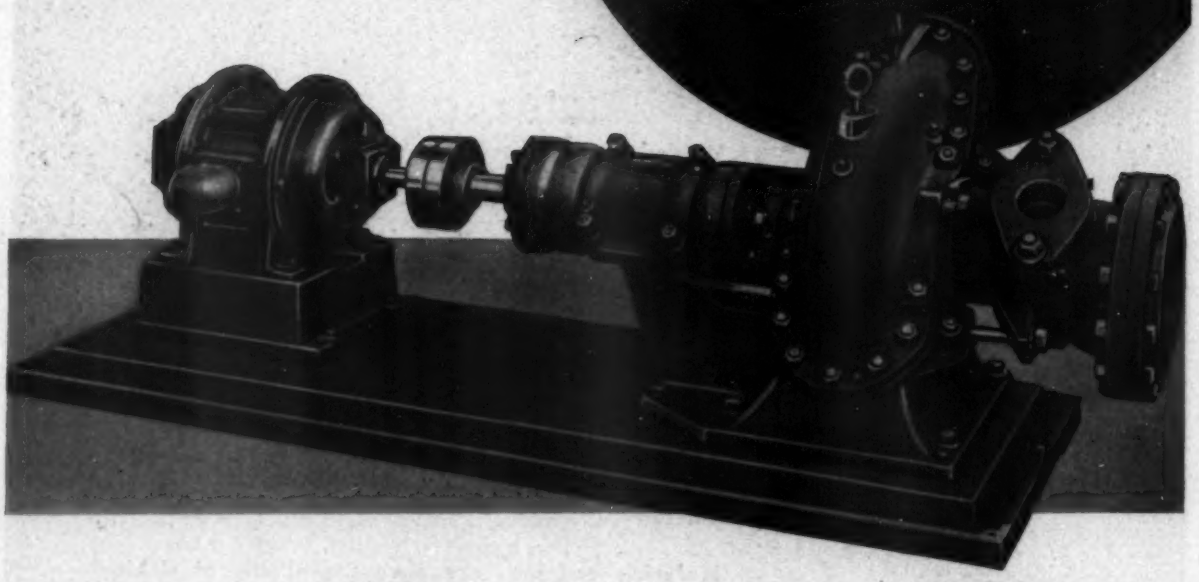
SEMCO

Stebbins Engineering and Manufacturing Company

WATERTOWN, NEW YORK

WHEN YOU ANALYZE PUMPING COSTS

CONSIDER GOULDS PAPER STOCK PUMPS



Pumping heavy paper stock and delivering full rated capacity at all times without a shut-down call for pumps designed and built for this exacting service.

Goulds Fig. 3105 is just such a pump. It is free from the annoying trouble of air binding which sometimes causes complete stoppage. All Goulds Paper Stock Pumps have horizontal top discharge at the highest point in the pump casing, and there is no place for air binding to occur.

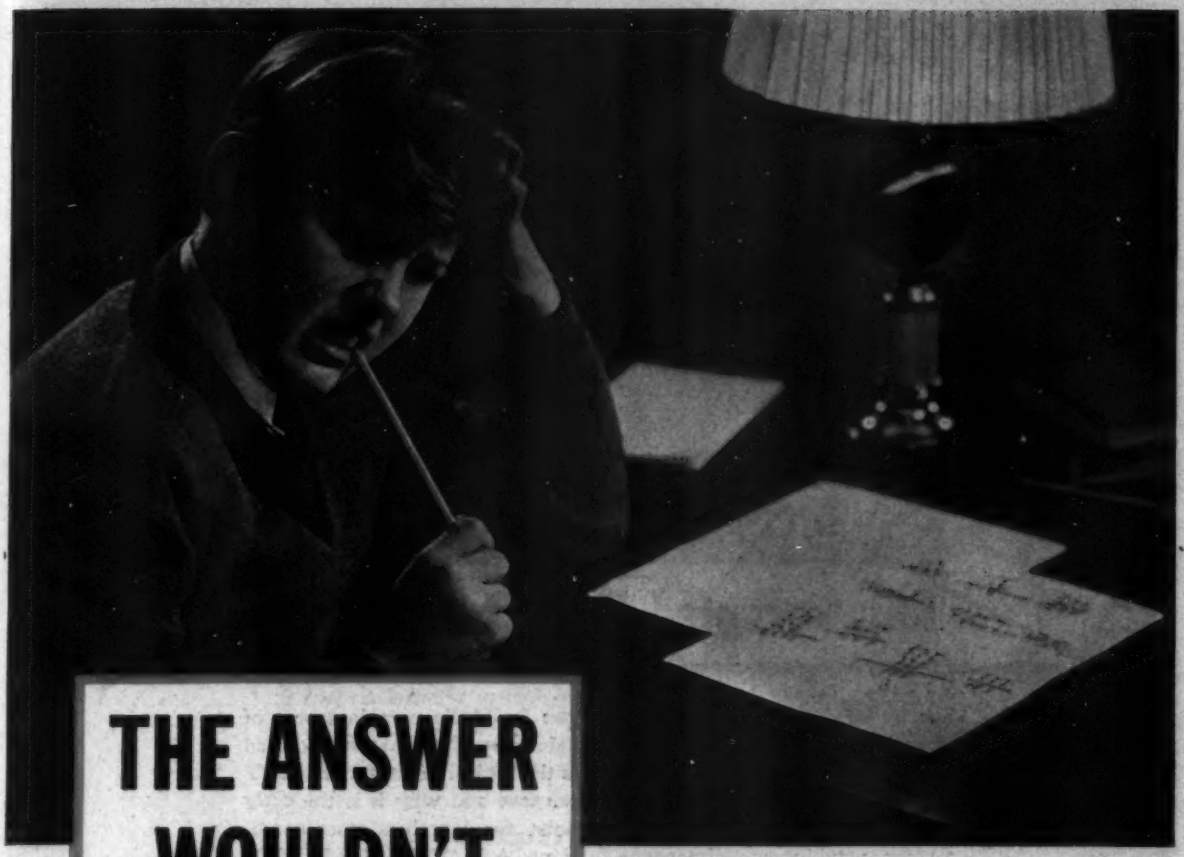
More and more Paper Mills are taking steps to protect themselves from air binding by installing Goulds Paper Stock Pumps.

Write for Bulletin No. 206—it tells the complete story of Goulds Pumps for the Paper Industry.

GOULDS PUMPS Inc.

ATLANTA, BOSTON, CHICAGO, HOUSTON, NEW YORK, PHILADELPHIA, PITTSBURGH, TULSA. Representatives in all Principal Cities

8306



THE ANSWER WOULDN'T COME!

Day after day this paper company had wrestled with a tough problem in bearing lubrication

LIKE A KID with his first algebra equation, a large paper manufacturing concern had wrestled with a lubrication problem until they were blue in the face.

For years this company had experimented, trying to find a satisfactory lubricant for the dryer rolls of their paper machines. Learning of their problem, Shell engineers offered their services.

Working with the company's maintenance men, dryer-roll bearings were taken down and all parts, including oil wells, cleaned.

New babbitt was applied and bearings carefully reassembled. Then in each bearing a different lubricant was placed—including the Shell Lubricant specified by the Shell engineers for this type of job.

At the end of a ten-day run, in which bearing speed averaged 60 R.P.M., the bearings were taken down and the oil in each one drained off into bottles while still hot.

A careful examination of the results showed the superiority of the Shell Lubricant. The bearing was in perfect condition—not a trace of carbon present. The lubricant itself was in excellent condition, and but ¾ of a pint had been consumed in 269 hours of continuous operation. The problem was solved!

Those are the facts from Case History No. 319 in Shell's files. If you are having lubricating difficulties, you will do well to paste this ad in your hat. The men who solved this company's problem can lick yours. They bring you a big "plus" in lubrication—engineering skill tested in every industry combined with the finest lubricants being refined today. Simply call or write your nearest Shell office.

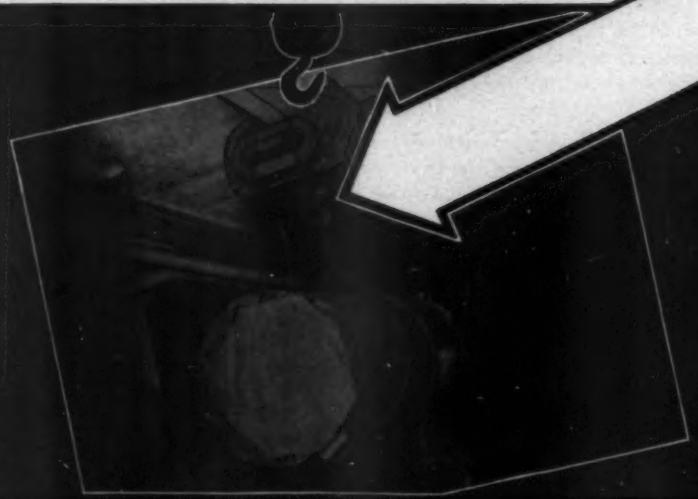
SHELL *PAPER MILL* **LUBRICANTS**

SHELL

Uninterrupted Performance Here

Specify THE hoist upon which you can depend. Let the nearest A-E-CO representative* show you features of A-E-CO Lo-Hed Hoists that assure constant performance and lower maintenance costs. Ask him to explain Lo-Hed's exclusive features. Let him show you Lo-Hed's uses in scores of industries. Find out *why* Lo-Hed is the logical hoist for EVERY purpose and why it is the *only* hoist for low headroom conditions. A-E-CO Lo-Hed HOISTS are built in 98 standard models —from ¼ to 12 ton capacities.

Means Continuous Handling Here



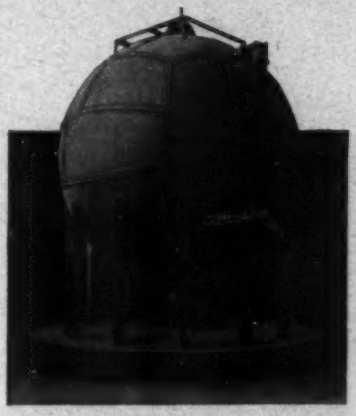
*Classified phone directories list the local A-E-CO representative in principal cities. Call him in . . . or write us for the new hoist catalog. This catalog clearly shows you how to select the specific hoist for your requirements.

Other Products: Hele-Shaw Field Power Pumps, Motors and Transmissions • Taylor Stokers • Water Cooled Furnaces • Ash Hoppers • Marine Auxiliaries.

A-E-CO Lo-Hed HOIST

AMERICAN ENGINEERING COMPANY

2444 ARAMINGO AVENUE, PHILADELPHIA, PA.



THE ACCUMULATOR
The Heart of the Chemipulp Process

QUALITY PAYS

★ *Improvement in the quality of any product always produces an increase in the demand for that product. The Chemipulp Process will improve the quality of your pulp, and at the same time reduce the cost of producing this pulp.* ★ *We would be very glad to demonstrate to you how this improvement can be accomplished.*

CHEMIPULP PROCESS INC.

500 WOOLWORTH BUILDING
WATERTOWN, N. Y.

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Appleton FELTS

MAKE GOOD PAPER

APPLETON WOOLEN MILLS, APPLETON, WIS.

...You profit beyond belief when research rings the bell

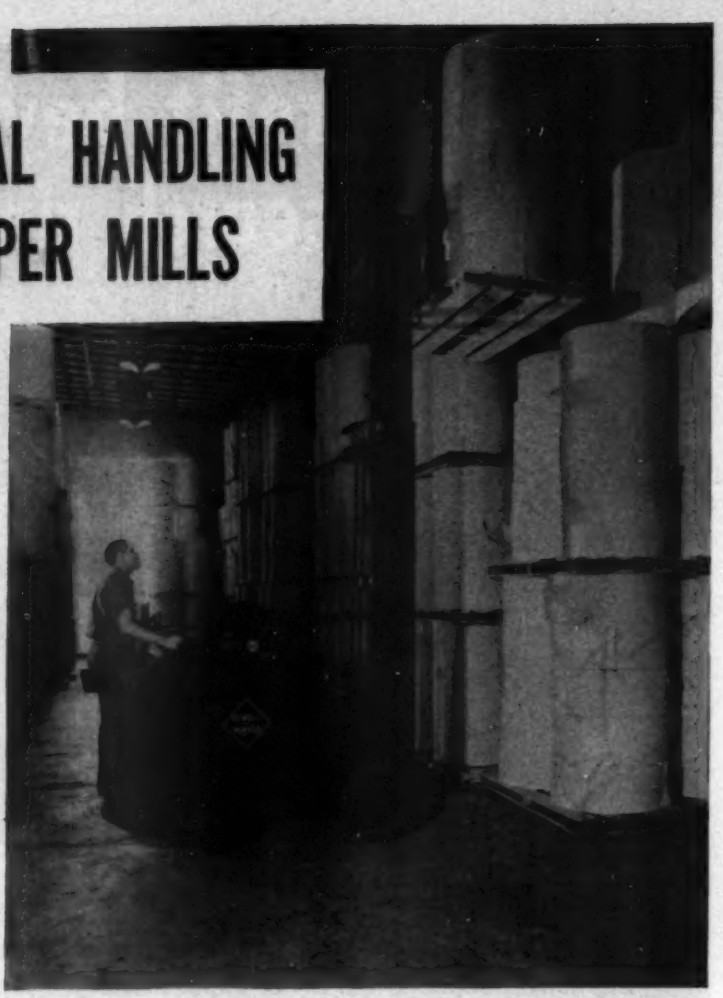
No other builder of paper mill machinery can match the record of Black-Clawson and Shartle Brothers for outstanding contributions to the art of paper making. Thousands of dollars spent each year on fundamental research enables them to "ring the bell" frequently with new and improved equipment. ● You, of course, profit by their ceaseless efforts in research. For example, the results obtained with Tugboat Annie are far greater than those of other pulpers. And no other Fourdrinier improvemements offer half the advantages of those recently developed by the B-C-S organization. Keep your eyes on Black-Clawson and Shartle Brothers . . . builders of tomorrow's paper mill machinery.

BLACK-CLAWSON and SHARTLE BROS.

B-C SHARTLE

REDUCING MATERIAL HANDLING EXPENSE IN PAPER MILLS

AGAIN TIMKEN BEARINGS SLAP DOWN HIGH COSTS



TIMKEN BEARING EQUIPPED

A symbol of quality for any piece of equipment with which it is associated

The advantages of TIMKEN Roller Bearings in paper mills are by no means confined to paper making machinery. TIMKEN Bearings save power and lubricant, prevent shaft wear, hold shafts in alignment and promote long equipment life wherever used. An example is the Elwell-Parker Shop Truck pictured above. It is equipped with 22 TIMKEN Bearings; the points of application include front and rear wheels, differential and elevating chain sprockets. It will pay you to specify "Timken Bearing Equipped" when buying material handling equipment just as it does when buying paper making machinery.

THE GREEN DIAMOND, Illinois Central Railroad, Speeds Smoothly On TIMKEN Roller Bearings.

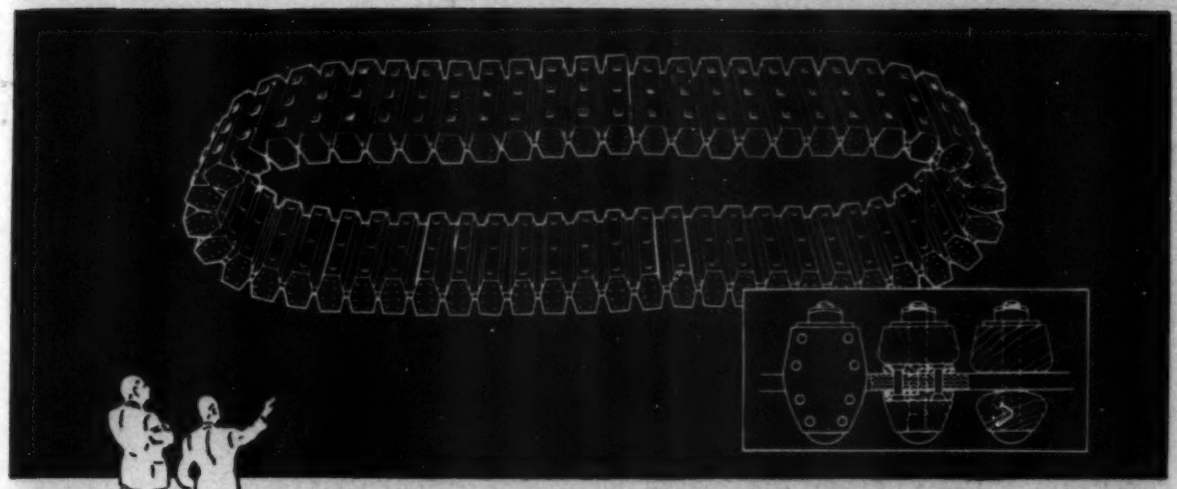
GLIDE—as you ride a Timken Bearing Equipped train

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN

TAPERED ROLLER BEARINGS



To Superintendents and Engineers
whose judgment industry calls good

Lewellen Service

The advice of Lewellen Engineers is yours for the asking. Our service entails invention, development and counsel in the application of speed control to your particular need.

Once you've tested the exclusive features of a Lewellen Variable Speed Transmission, any other mechanism seems a flash-back to the pioneer days of speed control transmissions.

The deeper your eye probes, the higher will soar your enthusiasm when you learn about Lewellen's flexible bearing suspension that is self-aligning in every direction—the mounting of thrust bearings at the outer end of the disc hub—a simple, positive lubrication system for disc hubs, keys and shafts—and the famous double block belt and unbreakable belt splice. All these outstanding features in a Lewellen Transmission mean years of DEPENDABLE, LOW-COST SERVICE.

The Lewellen DOUBLE BLOCK BELT AND UNBREAKABLE BELT SPLICE

(*Illustrated above*) Our spotlight may well be turned to these two features that play such an important part in the smooth, dependable performance of a Lewellen Transmission. Step by step a Lewellen Double Block Transmission Belt is handmade with painstaking methods. A single tip of top grade leather covers the ends of both the inner and outer blocks as well as the space between the blocks. This special feature increases the contact between the belt and discs, and thereby insures a more positive drive by reducing slippage to a minimum and by transmitting the rated load with less tension upon the belt, bearings and shaft. Since the face of the tips is not ground, the full wearing value of the hair side of the soft-tanned leather is preserved, insuring long life and maximum frictional contact with the discs.

The Lewellen Unbreakable Belt Splice is a unique, distinctive feature. The usual steel splice plate has been eliminated in order to reduce the weight of the splice. A new type splice plate is riveted to each end of the belt. These plates are drilled with holes that exactly match the specially finished heads of the rivets in the opposite plate. The result—A PERFECTLY MATCHED SPLICE. The plates are held rigidly in place by wood splice blocks and bolts while the entire load on the belt is transmitted through the rivet heads and splice plates.

Lewellen Transmissions are made in both horizontal and vertical types—in open frame and enclosed styles. All standard sizes and speed ranges.

Get this important fact... There is a Lewellen Transmission to meet your need for variable speed control

A recent report from a Veneer Mill shows a production increase of 77% since the installation of a Lewellen Transmission and Automatic Controls on a $10,000.00 lathe. (Invariably the initial cost of a Lewellen Transmission and Controls represents a small fraction of the investment in the equipment it controls.)

In an automobile plant, a Lewellen Transmission and Automatic Controls maintain a uniform weight of upholstering padding from a group of machines representing an investment of at least $100,000.00. Production is increased and their product improved.

Call a Lewellen representative or write us NOW!

LEWELLEN MANUFACTURING CO., COLUMBUS, INDIANA

★ *Lewellen* ★
VARIABLE SPEED TRANSMISSIONS

Through the Centuries with Alkalies

In the American Colonies soap-making was at first largely a household art. The housewife saved the wood-ashes (soda) from the great fireplaces and the grease from the kitchen. By pouring water over the ashes lye was made. The lye and grease were then boiled together until the compound was strong enough to hold up an egg. This strong soft soap was kept in a wooden soap box in the kitchen where it was available alike for Saturday night baths and the family laundry. Later on caustic soda was bought at the grocer's and mixed with hot fat and grease for the home-made soap.

Such resourcefulness and thrift as the Colonial housewife practiced is of vital importance to American business today. In the face of mounting costs and heavy taxation, executives are checking sources of supply with great care and buyers of raw materials are testing quality as never before. As a supplier of Soda Ash, Caustic Soda, Bicarbonate of Soda, Modified Sodas, Calcium Chloride and Liquid Chlorine, serving many major industries, The COLUMBIA ALKALI CORPORATION welcomes this challenge and this responsibility. Its officers and staff pledge themselves anew to deliver the utmost in product, value and service.

SODA ASH
CAUSTIC SODA
SODIUM BICARBONATE
MODIFIED SODAS
LIQUID CHLORINE
CALCIUM CHLORIDE

COLUMBIA

THE COLUMBIA ALKALI CORPORATION

BARBERTON • OHIO

NEW YORK CHICAGO BOSTON PITTSBURGH
CLEVELAND CINCINNATI ST. LOUIS MINNEAPOLIS

DE LAVAL *Clogless* PUMPS

Meet the special and stringent requirements of pumping solids in suspension

1—The passages are wide and free, but proportioned to give high hydraulic efficiency;

2—Immediate access to interior without disturbing piping is provided by the horizontally split casing;

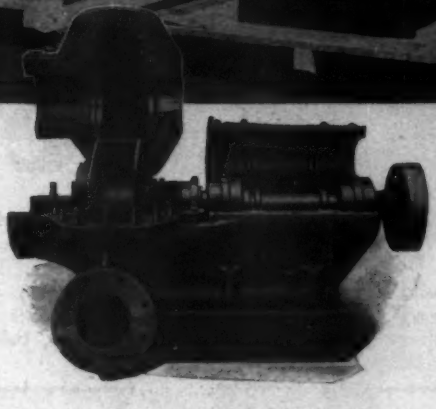
3—Parts of impeller and casing subject to rapid wear are protected by renewable wearing parts; (As all parts are interchangeable on a limit gage basis, these do not require fitting)

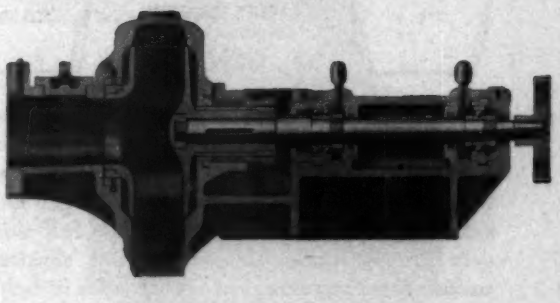
4—The construction is heavy, and substantial bearings are used, to give rigid support to running parts;

5—The impeller is designed to have a steep head-delivery characteristic, which tends to prevent clogging;

6—The pump casing and bearings are designed for vertical as well as horizontal mounting.

Ask for Catalog B-1





● Above are shown five of a shipment of seven De Laval Clogless pumps, six of which are designed to deliver 10,400 g.p.m. each against 15 ft. at 294 r.p.m., and one to deliver 7,000 g.p.m. against 27 ft. at 547 r.p.m.

3300

DE LAVAL *Steam Turbine Co.*
TRENTON, N. J.

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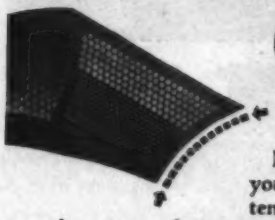
Here is Plain Proof

that V-Belts NEED the

Concave Side



Bend any V-belt and here is what you will notice: The top is under tension and becomes narrower. The bottom, under compression, *widens*. These stresses distort a *straight-sided* V-belt into a shape that does not fit the sheave groove—as shown in Figure 1, below. Note the out-bulge of the sides.

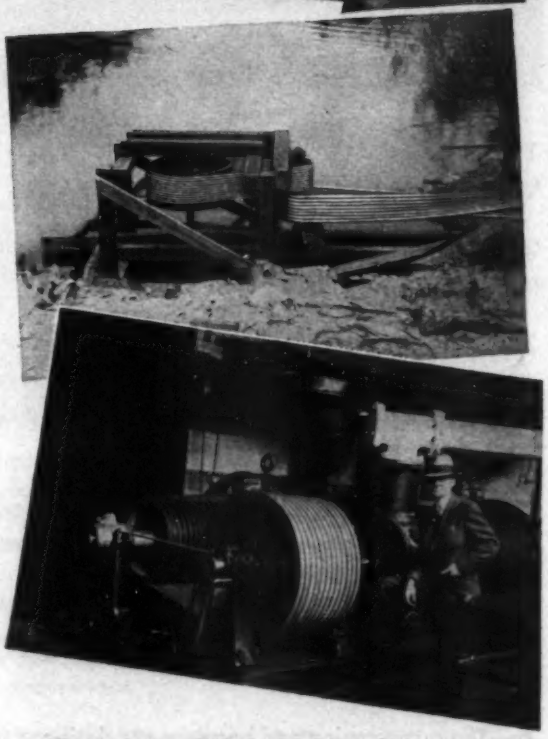
FIG. 1

WHAT HAPPENS WHEN A V-BELT BENDS

FIG. 2

Now look at Figure 2. Here you see that the same *shape change* merely *straightens* the precisely engineered concave side. There is no side-bulge. *Two* savings result: 1. You get *uniform* side-wall wear, *longer life!* 2. The full side-wall grip on the pulley insures against slippage on sudden load increases—a saving both in belts and *power*.

The Gates Vulco Rope is the only V-Belt built with the patented concave side.



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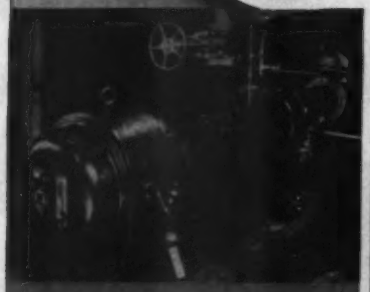

Pump handling paper stock at 1200 gpm. driven by a 50 hp. Westinghouse splash-proof motor.

Pump handling water at 6000 gpm. driven by 150 hp. Westinghouse splash-proof motor.

Vacuum pump driven through a V-belt by a 50 hp. Westinghouse splash-proof motor.

Exhauster type fans driven by 2 hp. Westinghouse totally enclosed, fan-cooled motors. In the background, a Westinghouse-driven conveyor.

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The West Virginia Pulp & Paper Company knows the importance of matched equipment, in maintaining quality production at reasonable cost. That accounts for the use of Westinghouse electric drives and control for pumps, compressors, fans and agitators in the new Piedmont Bleaching Plant. And performance has proved the wisdom of this choice.

The long and varied experience of Westinghouse engineers in every branch of the pulp and paper industry makes their cooperation of real value. If you are planning new equipment, modernization, or a new mill, it will pay you to investigate Westinghouse planning service. Address the local office, or write to Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

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"ALL PURPOSE" PAPERS *now are* OPAQUE, WHITE *and* BRIGHT

...*because* TITANOX PIGMENTS *make them so!*

INTRODUCTION of TITANOX pigments as a filler in utility paper manufacture has produced a new series of "all purpose" papers that are finding favor everywhere.

These papers are opaque, clean and brilliant as a result of the exceptional opacity, whiteness and brightness of TITANOX pigments. They have excellent printability and strength. They contrast in every way with the often dull, discolored and transparent papers formerly in use. And such papers are very economical to produce since only a small amount of TITANOX pigment is necessary as a filler.

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The high compressive strength of Ryertex together with its low coefficient of friction makes it particularly suitable for the heavy varying loads on grinder bearings. The use of water as the only lubricant is another decided advantage as the elimination of grease and oil promotes cleaner stock.

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Ryertex Bearings are showing very definite financial savings on grinder applications. Their initial cost is low—all oil expense is eliminated—their life is many times that of babbitt—shaft wear is eliminated—and due to the low coefficient of friction there is considerable power saving. Let us send you data on specific installations.

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RYERSON

New Approach to Foreman Training

CHARLTON MacVEAGH

A LEADING industrial relations authority declared recently that the personnel man and the factory foreman had come to be the industrial equivalent of the forgotten man. Salesmen, scientists, engineers, accountants and the other white collar or professional members of the company family have been trained intensively by industry to meet new and changing conditions. Meanwhile, the personnel men and the supervisory staffs have been left all too often to solve their problems with out-moded and inadequate equipment. At the same time, the nature and number of their perplexities have been approaching the all-time high set by those of Biblical Job.

Industry is now beginning, however, to realize more keenly than ever before the vital necessity of properly training its sub-executives in the art of handling men. Leaders in every industry have had it brought home to them, particularly in recent months, that the foreman is the real "key man" in any industrial plant. He is the man who stands on the firing line between management and men. He must interpret company policies and regulations to the men; tell them intelligently or otherwise, what it is all about and why the company is good or bad to work for. In turn, he reports back to management the temper of the men, the reasons for their grievances, and the conditions that require alteration or elimination to maintain good-will.

A number of independent surveys have shown that the chief cause of friction between management and plant labor is inept handling of the workers by their immediate superiors—the foremen and supervisors. A foreman who has been trained to handle his men the right way and to help his men to think straight about their relations to the company, is one of the company's greatest assets. An indifferent foreman is just as certainly a liability because often he is the reason for some of industry's severest headaches.

Management has been aware of all this, and in various ways has been searching for the proper prescription.

Executives of the country's most progressive companies have been hard at work striving to improve employer-employee relations, to eliminate the petty frictions and disharmonies that, though apparently slight in themselves, nevertheless take their inexorable toll of production and profits. They have employed various methods of training their foremen and supervisors to become better leaders and to create co-operation and genuine loyalty on the part of the working force and in many instances they have been amazingly successful.

In addition, many progressive companies are taking steps to educate their foremen with regard to the hows and whys, the facts and figures of the company itself, in order that the foremen can make the workers understand the company's financial and production problems as well as does the management itself. Work of this type shows the men that they have a common interest with management and that all must work together if the company is to continue successfully and profitably in business.

One might expect foreman training to be as old as scientific management, but it is not. It is relatively new, and to a large extent has been an outgrowth of wartime conditions. When war came, the ranks of industry were rapidly depleted; many workers entered the armed services, and thousands of untrained men were promoted overnight into supervisory positions. These men had to be trained, and trained quickly. Training programs were rapidly devised and put into effect. Some were good; some were definitely bad. The outcome, however, was that industry discovered that foreman training produced results, and this lesson has

not been forgotten. Industry does not have to be told that, more than anything else, it needs good foremen. It realizes that the rapidly changing industrial scene has brought new conditions with which yesterday's foremen, unless trained to meet them, cannot hope to cope.

Last year a group of industrial and personnel executives, each faced with his own particular and pressing personnel and labor problems, determined to try to develop a new and more effective method of training their foremen and supervisors. Each of these men knew that his foremen were up against a more difficult situation than ever before, and that a troublesome period lay ahead. They knew, furthermore, that their foremen were faced with many new and perplexing problems; that the greater part of their job today—90 per cent of it was the general opinion—was handling men and dealing with human values. This was a very different situation than that which existed only a few years ago, when a foreman's principal job was to take care of technical and mechanical matters.

They wanted a new and more effective method of foreman training that would produce more definite and lasting results. An exhaustive investigation of the problem from every conceivable angle grew out of this obvious need. It disclosed that some of the most consistent causes of loss and labor trouble were familiar ones; others were less easy to isolate and analyze. Eventually, however, the material for the attack on these problems was decided upon.

As for the method, the use of talking pictures seemed logical chiefly because they combine the most effective methods of teaching—the union of sight and sound. People understand and remember what they see and hear. Moreover, the use of talking still pictures, or sound-slide films, made possible the production of service low enough in cost to be available to every plant in need of it, whether large or small.

For a number of years talking still pictures have been used to train salesmen, and in many companies the use of this technique has come to be regarded as indispensable. It is not new, except that it has not been applied before to foreman training. There seemed to be no reason why the personnel director should not have access to a vehicle which had worked so effectively for the sales manager; nor was there any reason to believe that the foreman would receive any less benefit from training by talkies than the salesman. At least some of his problems today are very definite sales problems. He sells company policies, facts and figures, management ideas and production methods to the men who make the product the salesman offers to the public or to the company's distributors. The successful foreman-salesman will use the same formula as the successful salesman—if it is given to him.

For instance, safety is a perpetual plant problem. A leading eastern toolmaker saw a talking-picture on the subject—a picture directed at foremen, not the employee group as a whole. Commenting on the film he said, "Here, for the first time, the principles of safety are taught to foremen just as for years we have taught our salesmen the principles of selling. Too often, the men in the plant regard safety regulations as arbitrary rules laid down by the management to which no great amount of attention need be given. But when we apply the principles of salesmanship—then we can land our workers for a bill of safety. They'll buy safety, because they want it."

Films visualize and dramatize the every-day problems encountered by foremen and supervisors in every type of industrial plant. There is no preaching, no propaganda. The films show how the problems arising in connection with fundamental subjects can be met and overcome in such a way that human relations, cooperation and good feeling within the plant will be improved. In effect, the service gives the foreman the same break as the salesman. For the first time it permits the foreman to see himself in action, and shows him, in a way that strikes right home, how the other fellow—the one in the pictures—deals with tough problems that he himself has confronted and doubtless puzzled over many a time.

The pictures are usually shown at the foremen's conference meetings which many plants now hold at regular intervals. Experience has shown that they have a surprising ability to release pent-up thoughts, feelings and ideas and to promote open, earnest discussion of what's wrong and what to do about it. They also free the discussions of the personal element and of preaching. No one in the particular plant is pointed to as being an offender. Instead, it is "that guy in the picture" who did the wrong thing, and "that other fellow in the picture" who knew what to do and did it in a straight-shooting, common-sense way. Those in the audience who may see themselves portrayed in an unfavorable light on the screen can keep their secret; but in most cases they get the point and shortly are seen to be acting in a more human, and less bull-headed manner around the plant.

"What has happened in our plant," said one old-timer, "reminds me of the way we used to clean out stagnant, scum-covered ponds when I was a boy. As soon as we fixed up a drain and let some fresh water flow in, all the scum was carried away and the pond was fine and clear. These pictures have cleaned away all that dissatisfaction and back-biting and soreness we used to have in the plant. Now we all say what we think and talk things over together, and we get along fine."

Other results that have been reported by users of the pictures include increased cordiality between management and men, submission of ideas that have saved many thousands of dollars, better morale and loyalty among the workers, reduction of waste, and a humanizing of the hard day's work that has meant more to the workers even than extra dollars in the pay envelope.

Industrial relations, the relations between employers and employees, are basically human relations. Most workers that are "sore" today are in that frame of mind, because they feel their boss is an inhuman enemy, who thinks only of production, efficiency, profits and getting the last possible bit of work out of every man. Let in a little of the light of common sense, let the boss be taught that his men are not machines but human beings like himself, and surprising things will happen.

This is what the talking picture presentation seems at least in some measure to be able to do.

Relationship of Government Printing Office to Paper Industry

M. S. KANTROWITZ, Technical Director, and R. H. SIMMONS, Associate Chemist*

THERE is no commercial enterprise more closely related and more dependent upon papermakers than the printing industry. The principal substance used by the printer is paper. It is to the printer what rag and pulp are to the paper manufacturer, his chief raw material. The Government Printing Office purchases all classes of paper from newsprint to the highest quality ledger and index paper on technical specifications. During the fiscal year ended June 30, 1937, purchases were made for 83,604,229 pounds of paper and 61,430,000 envelopes.

The Director of Purchases reports to the Public Printer that the paper purchases for this period amounted to $5,350,000 and for envelopes $89,000. Proposals for paper were sent in October, 1936 to approximately 150 firms for the 6-month term beginning January 1, 1937 and in April, 1937 for the 6-month term beginning July 1, 1937. These proposals resulted in the placing of 24 contracts for the first 6-month period and 18 contracts for the second 6-month period. The Schedule of Paper for the year specified 85 grades of paper under 168 items which were furnished by 67 different mills.

Table I indicates the quantities of the more important grades of paper purchased during the fiscal year ended June 30, 1937.

It may be noted that the largest single item is for 15,000,000 pounds of postal card bristol. The contractor for this item must deliver approximately 80,000 pounds daily to keep pace with the production of United States postal cards.

The law permits for contract periods of three, six and twelve months and in recent years these contracts have been established for six-month periods. In addition to regular contracts the office makes hundreds of purchases in the open market. These purchases consist of interfold and fanfold forms, tags, various envelopes, jackets and other paper and paper products not provided for in the schedule for contracts. The quantity and grades of paper and envelopes annually purchased are an index of the real market the Government Printing Office offers to the paper industry.

An inventory of the supply of paper and envelopes on hand at the end of this fiscal year furnishes a picture of the quantity of stock necessarily maintained in reserve in order to expedite government printing. This inventory is given in Table II.

In accordance with Section 3 of the Printing Act of June 12, 1895, the Joint Committee on Printing of the United States Congress sets standards for paper for the public printing and binding. Specifications are drawn by the Specifications Committee on Paper, upon which committee three officials of the Government Printing Office serve. These specifications are revised before each contract period to keep pace with new developments and meet new demands by government departments.

All deliveries of paper and envelopes are tested by the Government Printing Office laboratory for compliance with these specifications. The use of technical specifications is not only beneficial to the Government Printing Office, but is equally beneficial to the paper industry as a whole. It assures the buyer of equality in the kinds of paper offered by competitive bidders, and also assures the manufacturer or jobber that all competitive bids are based upon identical qualities in the paper.

Under the title "Standard Samples of Paper for the Public Printing and Binding" the Public Printer each year issues a sample book containing a compilation of standard samples of the various papers proposed for purchase with their specifications printed thereon. Unbound standard samples are furnished to bidders and contractors for their guidance as to the requirements for finish, formation and cleanliness and other characteristics which cannot be readily specified in numerical values. Complete unbound sets of these standard samples may be obtained upon request.

The Public Printer invites all bidders and contractors at any time they may so desire, to visit the Government Printing Office for the purpose of becoming acquainted with the apparatus and methods used in testing paper for the public printing and binding.

In co-operation with the United Typothetae of

Table I

Grade of Paper	Pounds
Newsprint	2,550,000
Book	17,185,635
Mimeograph	7,529,075
Map	674,332
Manifold	2,362,550
Writing	13,290,747
Bond	11,208,108
Ledger	1,338,615
Index	1,805,680
Cover	607,280
Wrapping	2,590,580
Postal Card Bristol	15,000,000
Tag Board	2,303,160
Card Board	1,506,360
Blotting	251,800
Binders Board	863,000
Miscellaneous Boards	1,637,000

(*) Prepared under the direction of Hon. Augustus E. Giegengack, Public Printer, U. S. Government Printing Office.

America, the Government Printing Office several years ago conducted research work in order to secure complete information as to the quality of bond and ledger papers offered commercially by the paper industry. Manufacturers were requested to furnish samples of their regular mill-brand papers. Forty-two paper manufacturers co-operated in this research by submitting 165 samples including 117 bond and 58 ledger papers. The work was begun in 1924 and completed in 1928. As a result of this work proposed specifications for six grades each of bond and ledger papers were published in February, 1928, in Technical Bulletin No. 4 of the Government Printing Office. In conformance with the recommendations published in this bulletin the Government Printing Office adopted these specifications for use in the purchase of five grades each of bond and ledger papers. These specifications have been modified somewhat in the past few years by increasing some of the physical requirements and adding definite requirements as to acidity and rosin sizing. They have proven satisfactory to bidders and manufacturers furnishing paper to the Government Printing Office and other branches of the Government service and are in harmony with good commercial practice.

Rag content bond and ledger papers are watermarked to show their rag fiber content. This watermark consists of the seal of the United States surmounted by four stars indicating 100 per cent, three stars 75 per cent, two stars 50 per cent and one star 25 per cent rag content.

The quality of kraft paper purchased under government specifications up to and including 1925 was determined primarily by the bursting strength test.

Table II—Inventory of quantity and cost of paper and envelopes on hand June 30, 1937.

Description	Pounds	Cost
Paper and Envelopes		
Printing	3,315,000	$216,470.70
Mimeograph	781,000	45,009.40
United States money-order writing	70,000	6,462.50
Safety writing	37,000	3,351.20
Writing	2,374,000	157,528.10
Map	99,000	13,647.10
Manifold	393,000	59,078.50
Bond	2,621,000	221,720.25
Ledger	750,090	85,810.19
Index	553,273	54,261.53
Cover	228,079	21,963.42
Manila	265,000	19,029.40
Kraft	407,000	17,327.55
Manila tagboard	593,000	40,934.80
Cardboard	105,160	5,907.20
Bristol board	1,740,000	81,622.60
Miscellaneous	147,600	15,589.01
Binders board	575,684	16,166.77
Envelopes		23,250.02
Total, paper and Envelopes		$1,105,130.24

However, this test alone was found unsatisfactory for indicating the quality and serviceability of this paper. It was found necessary therefore to conduct research to find more definite tests for the evaluation of kraft paper for use in revising the specifications for its purchase by the Government Printing Office.

In 1925, certain paper mills were requested to cooperate in this investigational work by furnishing kraft paper samples of their manufacture. Fourteen manufacturers co-operated and submitted samples for test purposes. As a result of these tests, specifications were drawn for the purchase of No. 1 and No. 2 quality kraft papers and envelopes. This research work which lead to the development of such specifications for kraft paper was published in Government Printing Office Technical Bulletin No. 12. The kraft paper manufacturers who co-operated in this work, as well as the National Kraft Manufacturers' Association and the Southern Kraft Manufacturers' Association, manifested considerable interest as shown by their requests for copies of this technical bulletin.

In co-operation with the mechanical department of the American Newspaper Publishers Association during the period between 1928 and 1933, considerable research work on newsprint was conducted. The results of this work were published in Technical Bulletin No. 18, "Newsprint and News Ink." This bulletin was in great demand by members of the Association.

The Government Printing Office research work in recently developing tests for evaluating the printing qualifications of paper in numerical terms has attracted much attention throughout the Paper Industry. A preliminary report on this work was presented at the annual meeting of the Technical Association of the Pulp and Paper Industry in February, 1932, and a progress report on this subject was presented at the eighteenth annual meeting of the American Pulp and Paper Mill Superintendents Association in June, 1937.

The results of all research work on paper conducted by this office are published in the form of bulletins or are printed in trade journals for the benefit of the Industry. The following is a list of such technical bulletins and articles published thus far by the Government Printing Office for the benefit of the paper industry:

Determination of the fiber content of paper,* *Technical Bulletin No. 1.*

Tentative specification for bond and ledger papers,* *Technical Bulletin No. 2.*

Proposed specifications for bond and ledger papers,* *Technical Bulletin No. 4.*

Preliminary Report on the Determination of pH Values and Total Acidity in Paper, *Technical Bulletin No. 8.* (Reprinted in Paper Trade Journal, Vol. 90, No. 26, January 26, 1930; and *Technical Association Papers,* Series XIII, May, 1930).

Progress Report on Study of Newsprint and News Ink,* *Technical Bulletin No. 9* (Reprinted in *Mechanical Bulletin No. 43* of the American Newspaper Publishers Association).

Technical Specifications for Paper Users, *Technical Bulletin No. 10* (Reprinted in *Transactions of American Society of Mechanical Engineers,* Vol. 52, No. 19, May-August, 1930).

Progress Report on the Determination of pH Values and Total Acidity in Paper,* *Technical Bulletin No. 11.* (Reprinted in *Paper Trade Journal,* Vol. 91, No. 14, October 2, 1930; Technical Association Papers, Series XIV, May, 1931; *Paper Makers Monthly Journal,* Vol. 68, No. 12, December, 1930).

A Study of the Methods of Evaluation of Kraft Paper, *Technical Bulletin No. 12.*

Second Progress Report on Study of Newsprint and News Ink,* *Technical Bulletin No. 13.*

Third Progress Report on Study of Newsprint and News Ink,* *Technical Bulletin No. 16.*

Newsprint and News Ink, *Technical Bulletin No. 18.*

Rapid Methods for the Determination of Bleached and Unbleached Fibers in Pulp and Paper, *Technical Bulletin, No. 20.* (Reprinted in *Paper Trade Journal,* Vol. 98, No. 10, March 8, 1934. *Technical Association Papers,* Seventeenth Series, 1934).

Paper Standardization Benefits Printers, *Typothetae Bulletin,* January 7, 1924.

Discussion of Standard Atmospheric Conditions for Paper Testing, *Paper Trade Journal,* Vol. 78, No. 9 (Feb. 28, 1924); *Industrial Engineering Chemistry,* Vol. 16, 1924).

Technical Testing of Paper for Specifications, *Typothetae Bulletin,* Vol. XIX, No. 15 (July 14, 1924).

Humidity Standard for Paper, *Paper,* Vol. 34, No. 19 (Aug. 28, 1924).

Relative Humidity and Paper Testing, *Paper Trade Journal,* Vol. 79, No. 15 (Oct. 9, 1924).

The Testing of Paper, *Paper,* December 4, 1924.

Effect of Temperature and Relative Humidity on the Folding Endurance of Papers, *Paper Trade Journal,* Vol. 79, No. 25 (Dec. 18, 1924).

Frequently the technical director or his assistants are requested to deliver addresses on various subects relating to paper before organizations of the paper industry or those closely allied to the paper industry. The following papers have been presented before clubs of Printing House Craftsmen and at the annual conventions of the Technical Association of the Pulp and Paper Industry, American Pulp and Paper Mill Superintendents' Association, the Graphic Arts Research Bureau and the American Newspaper Publishers Association. They were published in various trade journals.

Standardization of Paper, United Typothetae of America Convention, October, 1923.

Atmospheric Conditions for Paper Testing (Minority report of Technical Association of the Pulp and Paper Industry Paper Testing Committee), *Paper Trade Journal,* Vol. 82, No. 18 (May 6, 1926).

Ink Resistance of Printing Papers (Report of Subcommittee on Resistance of Printing Papers of the Technical Association of the Pulp and Paper Industry Paper Testing Committee), *Paper Trade Journal,* Vol. 86, No. 14 (March 22, 1928), pages 54-56; Technical Association Papers, June, 1928.

Paper Standardization as an Aid to the Printer, meeting of Printing House Craftsmen of York and York County, Pa., April 13, 1931.

What the Standardization of Paper Means to Producers and Purchasers, National Association of Purchasing Agents, Toronto, June 10, 1931, *The Purchasing Agent,* June, 1931; ASA Bulletin, October, 1931.

Report of Sub-committee on Ink Resistance of Printing Papers, *Paper Trade Journal,* March 31, 1932; Technical Association Papers, 1932; *LePapier,* May, 1932, p. 517.

Permanence of Paper, Convention of American Pulp and Paper Mill Superintendents' Association, June 2, 1932, *Paper Trade Journal,* June 9, 1932, p. 57; *Paper Mill,* June 4, 1932, p. 24-28.

The Bekk Smoothness Tester as an Aid in Studying the Printing Quality of Paper, *Paper Trade Journal,* Vol. 96, No. 4, (January 26, 1933); *Technical Association Papers,* Sixteenth Series, 1933, p. 264-268.

Government Printing Office Paper Tests and Their Significance, *Paper Trade Journal,* Vol. 99, No. 1, (July 5, 1934); *Paper Mill,* Vol. 57, No. 25, (June 23, 1934); Year Book, The American Pulp and Paper Mill Superintendents' Association, 1934.

Printers' Paper Troubles Encountered at the Government Printing Office, *Paper Trade Journal,* June 13, 1935; *The Paper Mill and Wood Pulp News,* Vol. 58, No. 23 (June 8, 1935).

The Technical Status of Permanence and Durability of Paper, Proceedings of the Graphic Arts Technical Conference, 1936; *American Pressman,* Vol. 46, No. 9 (Aug., 1936).

Evaluating the Printing Qualifications of Paper, *Paper Trade Journal,* Vol. 105, No. 1 (July 1, 1937), *Paper Mill and Wood Pulp News,* Vol. 60, No. 27 (July 3, 1937).

Under the Printing Act of January 12, 1895, provision was made for the sale, distribution, cataloguing, and indexing of Federal Government publications. During the fiscal year 1937 the Documents Division of the Government Printing Office distributed 802,567,950 copies of government publications and forms. There were 22,612,716 copies of publications on hand July 1, 1937. Since 1895 copies of each government publication have been deposited in the Library of the Documents Division of this office. Thus the library contains 772,131 different publications.

Among the books listed by the Superintendent of Documents is one on *Vocational Training for the Pulp and Paper Industry,* 1933, issued by the Federal Board of Vocational Education. Other publications such as Federal specifications for paper and paper products, research papers and reports, copies of laws, and rulings by the Interstate Commerce Commission are of interest to the paper trade. *The Patent Gazette,* published weekly by the Government Printing Office for the Patent Office, is of special importance to engineers, chemists and others interested in new developments of the paper industry.

The Documents Division of the Government Printing Office is the sales office through which the Government sells its publications. This office circulates, on request price lists of its many books and pamphlets. It behooves a person seeking information on any of a wide variety of subjects to write to the Superintendent of Documents for such information as he has available. It is difficult to find any subject on some phase of which there is not a pamphlet or book published by the Government Printing Office and for sale.

(* Out of print.)

The Government Printing Office sells a quantity of waste paper through the office of the Director of Purchases. During the past year 8,487,308 pounds of waste paper, for which the total receipts amounted to $55,-996.02, were sold.

Numerous requests are annually received by the Division of Tests and Technical Control for technical information concerning various problems pertaining to printing. Among these requests are letters seeking information relating to technical specifications, tests and standardization of paper.

Close contact is maintained with those mills which supply paper to the Government Printing Office. This close association is expressed by occasional visits of representatives of this Office to the mills and by frequent conferences with the paper contractors at the Government Printing Office.

The technical director and several of the associate chemists of the Government Printing Office are members of the Technical Association of the Pulp and Paper Industry and are active on several of its Committees. Through their services on these committees the Government Printing Office has assisted in formulating a number of the paper testing methods officially adopted by the Technical Association of the Pulp and Paper Industry.

The technical director is also a member of the Paper Specifications Committee of the Congressional Joint Committee on Printing, the Paper Specifications Committee of the Federal Specifications Executive Committee, the Paper Specifications Committee of Committee D-6 of the American Society for Testing Materials, and the Advisory Committee of the Lithographic Technical Foundation on Lithographic Papers.

Rubber Design Rolls

For Paper Finishing and Decoration

J. B. SHAUGHNESSY,
Manager of Rubber Printing Products Division
American Wringer Company

RUBBER design rolls are a definite and integral part of the paper industry and almost as necessary as felts, wires, and rubber rolls are to the paper machine. The diversified use of this type of roll and its adaptability to effecting finishes both by impression without ink and with ink on the paper machine, wet or dry end, or by individual printing units, makes it highly important to those who are endeavoring to get distinctive finishes which today are more necessary than ever before, due to the trend towards such papers, and to bolster a declining market. If dressing up a package sells it, why not dress a paper?

Aniline printing and decorating "broke the ice." Many have benefited. Paper decorating on the paper machine is being done, and done well. Production is unimpaired; speed continues and no second handling is necessary.

Design press rolls used in the smoothing press position get one effect. Some mills go further and apply ink to the design and print on the wet end. Others use rubber rolls back in the dryers without ink and get an apparent "emboss." Still others use ink for another effect, while many decorate with ink or dye just before the rewind. When sufficient paper has been run, the design rolls are lifted and production goes on on plain paper. The aforementioned is done on reasonably long runs or sizeable orders on anything from kraft and news to quality offset, cover stocks, etc.

The average mill has a separate aniline or spirit ink printer for small orders. They can well afford it. A short or small run brings a higher price that compensates for second handling. Any short runs of beater dyed stock can be eliminated by the staining or printing and decorating operation being handled in the dryers or at the stacks.

Marking bands are in common use on a paper machine, and it is only a step from them to a complete over-all pattern. Both of these are made of rubber and a better mark with less damage or shearing action to the fibers is achieved, resulting in a sheet with a higher tensile strength and without discoloration.

A new type of roll used for this purpose, which might be termed as wet embossing, is one having a design made in rubber of one density extending from the surface to the metal core and run in conjunction with a smooth rubber roll of suitable density to act as a female in the embossing operation. The density of the rubber design roll, although constant throughout, is varied, depending upon the position in which the roll is to be run and the type of paper to be decorated.

These rolls are moulded from a master and naturally are less expensive than the manually tooled type of roll. Furthermore, it is possible through a moulding process, to get an exact duplication of an original as the human element does not enter into it. Fineness of designs and intricacy of detail are handled equally as well as simple patterns.

The manufacture of design rolls, having diameters of 22 to 24 inches and lengths of 100 to 150 inches, is comparatively simple and the cost nominal.

It is the author's opinion that paper mills having ideas or problems along this line, can readily solve them by taking advantage of the fact that they can get distinctive patterns, trade-marks, and designs aside from ordinary felt or fabric finishes that never vary for any reason from one run to the next, provided the stocks are reasonably uniform and, in the event a roll should wear out or be damaged, it can be duplicated exactly the same as the original.

Limits for the use of this idea would be difficult to establish, but it is believed that sales can be increased and production costs lessened materially through its adoption in one form or another.

Southern Sulphate Industry Unfolding

By HARRY E. WESTON

Container Corporation of America

Fernandina, Florida

Brunswick Pulp & Paper Company

Brunswick, Georgia

North Carolina Pulp Company

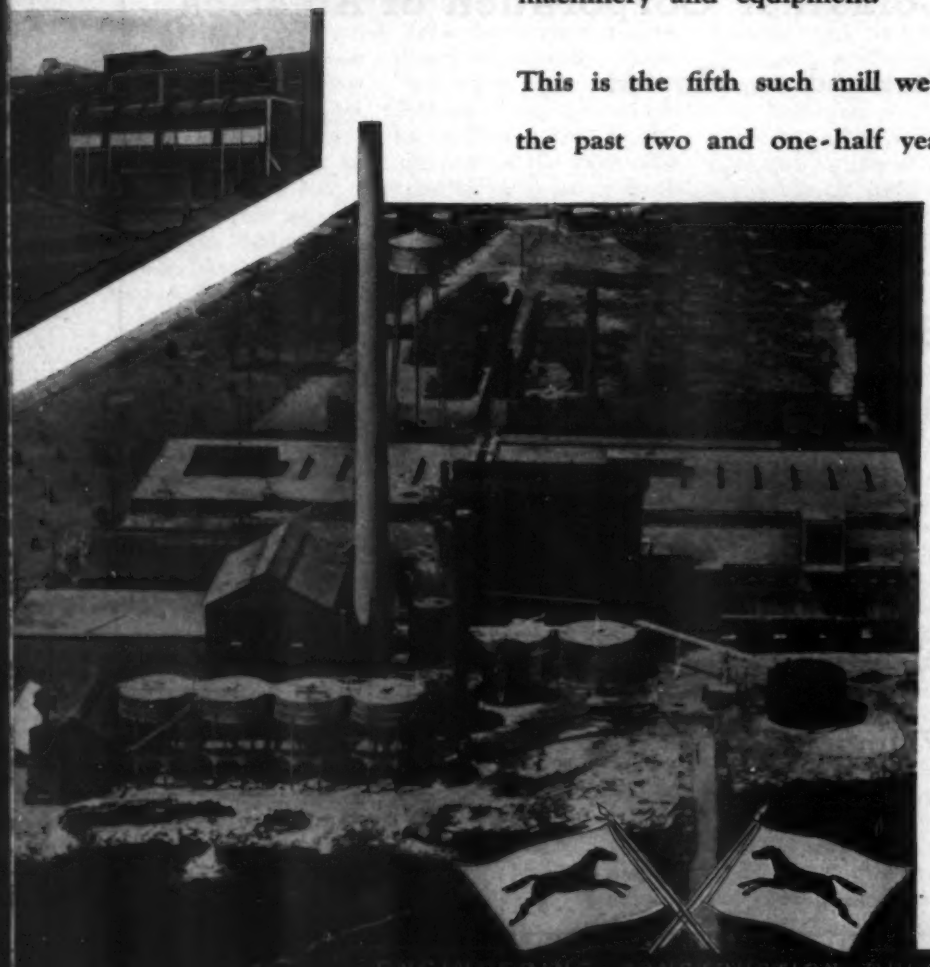
Plymouth, North Carolina

Another Record Accomplishmen

SEVEN months to the day after the National Container Corporation completely turned over the site to us to build a 200-tons-daily capacity pulp and paper board mill at Jacksonville, Florida, satisfactory paper was rolling up on the reel at the finish end—twenty-eight minutes after pulp was delivered to the paper machine. The first run (more than five hours) was completed without a break.

This mill was built in its entirety by the Engineering Construction Division of Merritt-Chapman & Scott Corporation from foundations to the complete installation of the producing machinery and equipment.

This is the fifth such mill we have built in the South in the past two and one-half years. Together, they constitute a succession of records for speed, economy and satisfaction to the owners.



Airview of completed pulp mill of National Container Corp., Jacksonville, Fla. Small illustrations show special equipment.

ENGINEERING CONSTRUCTION DIVISION

MERRITT-CHAPMAN & SCOTT CORPORATIO

Container Corporation of America

Fernandina, Florida

IN northern Florida, on the island of Amelia, about three-quarters of a mile from the center of the quaint, historic town of Fernandina and within a stone's throw of old Fort Clinch is located the new 150-ton kraft pulp mill of the Container Corporation of America. The site of the mill is on the east bank of the Amelia River and consists of approximately 200 acres. Only a short distance from the mill site and within view of the mill, the river empties into the Atlantic Ocean.

Mill Site

Most of the land comprising the site is made up of a flat sand fill. The original site was low and considerable of it was below water during high tide. Since the mill went into operation, much of the fill has been carpeted with bark removed from the wood during the barking operation. This bark not only serves as a blanket to withhold the sand from being blown by the wind but it also serves to reduce sun glare. Likewise, possibly in the future, at least for that portion of the site which may be landscaped, it will serve as a base for such earth as may be added to expedite the landscaping.

The nature of the terrain of the site prompted the construction of a rather unusual network of roads within the property. These roads, designed for rather heavy loads, are constructed of crushed stone and asphalt. The asphalt serves as a binder to prevent the stone from working into the sand, and together, when mixed as they are, they present an excellent road surface.

General Mill Arrangement

The wood yard as well as the mill buildings in general parallel the shoreline of the Amelia River. Four railroad spurs, two for receiving pulpwood, one for chemical raw materials, and one for the shipping of pulp also parallel it. Likewise on the river front are two wharves, one for receiving oil and salt cake and for shipping pulp, and the other for receiving pulpwood.

Pulpwood, thus delivered to the mill by highway, railroad or water may be placed in storage or may enter the manufacturing operations immediately.

Wood Handling in Yard

Major wood handling equipment includes a locomotive type crane, a special pulpwood handling grapple for the crane, and a system of pulpwood conveyors. The crane is a product of the Ohio Locomotive Crane Co.; the grapple, of Jos. F. Kiesler Co.; while Jeffrey Mfg. Co. supplied the pulpwood conveyors.

The arrangement of the pulpwood conveyors is extremely simple. A unit leading into the barking drum is fed by a main wood yard conveyor and by another yard unit which receives its wood from a barge unloader.

The main wood yard unit, arranged parallel to the two railroad spurs for delivering pulpwood and immediately alongside one of them as well as at right angles to the unit into which it discharges, is approximately 400 ft. long. The height of this unit, which for the greater part of its length is horizontal, is such as to permit ready loading with pulpwood from trucks or railroad cars by hand or from the yard or from railroad cars with the crane and grapple.

A loading platform or apron extends along each side of this conveyor for its full loading length and is built integral with it.

The platform, gently sloping, projects outward for about 5 ft. from both of the top edges of the conveyor trough. Its upper surface is of plate steel, the steel plate being supported by a solid assembly of planking arranged on edge, and the planking in turn by a wood framework.

The conveyor trough proper is of steel-plate construction; is V-shaped; and in its bottom is a channel section with the trough of the channel upright to carry the conveyor chain. The chain is Jeffrey C132.

This conveyor has been designed for a capacity of 30 cords per hour, as has been the conveyor which receives the wood from the barge unloader and the conveyor which delivers the wood from this unit as well as from the main wood yard conveyor to the barking drum. The capacity of the barge unloader is 25 cords per hour.

The length of the barge unloader approximates 65 ft.; that of its receiving conveyor about 400 ft.; and that of the conveyor which elevates the wood into the barking drum about 200 ft.

Barking Drum Installation

The barking drum is a Manitowoc unit. It is 12 ft. in diameter and 45 ft. long, and is of two-section design. Two girth gears and four tires surround the channel sections which comprise the shell. The four tires are cradled on rollers, a set of two rollers placed opposite one another for each tire. A line shaft, carrying two pinions, one for each girth gear, extends along one side of the shell above one line of supporting rollers from the inlet end of the drum to and terminating with the girth gear of the discharge section. This shaft is driven through a short center, flat rubber belt drive by a 150 hp., 514 r. p. m., 220 volts, G. E. motor which is pivoted on a Rockwood Drive base. The entire installation, supported by a monolith of concrete, is unhoused except for the motor, belt and pulley arrangement for driving the pinion shaft. Likewise, the installation has been made so that the drum is at right angles to the conveyor which feeds it. An intake chute of heavy structural steel and plate guides the wood from the conveyor into the drum; while another conveyor receives it from a chute of similarly heavy construction at the discharge end.

There also is a conveyor unit to

discharge bark from the drum. The bark, in turn, is delivered to a system of conveyors which convey it along with the sawdust from the screening operation in the wood room to the boiler house.

The conveyor receiving the barked wood from the barking drum, a conveyor 266 ft. long and with a capacity of 30 cords of pulpwood per hour, delivers the wood to the wood room and discharges it at a height that permits gravity feed to chipper. Other wood preparing equipment in the wood room includes two Orville Simpson Rotex chip screeners and a Waterville Iron Lombard chip crusher.

Chipping and Screening

The chipper is an 88 in. Carthage unit which is directly connected to a 200 hp., 277 r. p. m. Electric Machinery Mfg. Co. synchronous motor.

A metal chute connects the discharge end of the wood conveyor with the chipper spout. This chute, except for its entrance, is round in cross-section. Much of the round section is cutaway at the top and the area included by this cutaway portion wrapped in open spiral with heavy pipe. This pipe, in turn, is strapped longitudinally with two strips of strap iron.

The chipper, set up on the top floor of the wood room, discharges by gravity to the first of the two Rotex chip screeners which is located on the floor directly below. This chip screen designated as Rotex chip screener No. 522, has an upper screen surface of 5 ft. by 12 ft. 8 in. and a lower screen surface of 5 ft. by 12 ft. The top screen surface is clothed with a 1½ in. clear opening, .207 in. diameter steel wire screen; while the lower screen surface is a 6-mesh, .047 in. diameter steel wire screen with .120 in. opening. An individual motor and V-belt drive complete the unit.

Handling of Oversize Chip Rejects

Oversize rejects from this screen, which is designed to handle from 15 to 18 cords of wood chips per hour, pass directly over the discharge end of the upper screen surface into a 36 in. Lombard chip crusher. The crusher is located on the same floor as the chip screen, close to its discharge end and directly in line with it. A short metal hopper connects the crusher with the discharge end of the upper screen surface of the screen.

The lower screen surface of the screen separates the accepted chips from the sawdust, the accepted chips being discharged from it to a belt conveyor, the sawdust to a drag type conveyor.

The second Rotex chip screener, a No. 22, is set up on a structural steel framework from the ground floor level at such a height that the screen is positioned within several feet of the bottom of the floor above. It is located directly below the Lombard crusher and receives the discharge from it.

The upper screen surface of this unit is 40 in. by 62 in. Its lower screen surface is 40 in. by 56 in. The clothing for each surface is identical with the clothing of each corresponding surface of the larger unit.

This screen, driven through a V-belt and individual motor, has a capacity of 4 to 5 cords of wood chips per hour.

Accepted chips from this screen discharge to the same belt conveyor which carries the chips from the primary screen; while the rejects discharge to a drag type conveyor which delivers them to the conveyor system carrying bark from the barking drum to the boiler house.

Conveniently located on the ground floor of the wood room is a Covel-Hanchett, Size 100, Type AK, knife grinder. This grinder is used for the sharpening of the chipper knives.

Legends—Page 161

1—Front view of mill from machine room end—office at right.
2—Sign at main entrance to mill.
3—Yard view showing barking drum installation, wood room, and wood handling conveyors.
4—Chipper view showing charging chute and motor drive arrangement.
5—Plaque of Dr. Herty.
6—Wood handling grab on locomotive-type crane.
7—Main wood yard conveyor showing loading platform.
8—Primary chip screen and crusher.
9—Barking drum installation.
10—Operating floor of digester building.
11—The digester installation.

Conveyor to Chip Bin

A conveyor bridge, completely housed with corrugated siding and roofing and with a concrete floor in which steel treads have been set approximately a foot apart, connects the wood room with the digester house. This bridge carries the belt conveyor which receives the accepted chips from the screening operation in the wood room and delivers them to the chip loft above the digesters. It also houses for a considerable distance a portion of the conveyor system for handling the bark and wood refuse for the boiler plant.

The total length of the chip conveyor, which extends from the ground floor of the wood room to the far end of the chip loft, is 445 ft. This conveyor has a capacity of 8010 cubic feet of wood chips per hour. It is equipped with a U. S. Rubber belt, and is driven through a 30 hp., 880 r. p. m. gearmotor and chain drive. Alemite fittings are used on all troughing idlers. A hand-operated, portable tripper within the chip loft permits chips to be discharged from the belt into any part of the bin.

Bark Delivery to Boiler Plant

A transfer conveyor connects with the discharge end of the bark and wood refuse conveyor in the conveyor bridge and conveys its discharge to a storage hopper within the boiler plant. This bark and wood refuse conveyor, as is the case of each of the several conveyors of the system preceding it, has a capacity of 3 cords per hour. It is 143 ft. long; while the total length of the several other conveyors in the system is approximately 625 ft.

As in case of the wood handling conveyors in the wood yard which deliver the wood to the barking drum, this network of conveyors for the handling of barked wood, bark and wood refuse, and chips was furnished by Jeffrey Mfg. Co.

Chip Bin Details

The chip bin, fabricated by Jones & Laughlin Steel Corp., is of structural steel and plate. It is of riveted construction; is U-shaped; and has a capacity of 110 cords. Unlike most bins, it does not extend the full length of the digester

CONTAINER CORPORATION OF AMERICA
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house, but has one end, the end nearer the wood room, which is free from its corresponding digester building wall. In the bottom of the bin are two discharge openings, one for each of two virtical digesters which are located directly beneath them. There is a rack and pinion, hand-operated, horizontal gate arrangement for each opening and a hopper common to both of them. This hopper is supported on a track which extends along the bottom of the bin and on which it is moved by hand. Likewise, there are several steam line openings through the bottom of the bin which permit steam to be blown into the bin for the purpose of breaking down any chip arches which might occur.

Digesters and Auxiliaries

The digesters, supplied by Chicago Bridge & Iron Co., are both of welded construction; are each 12 ft. in diameter by 45 ft. 4 in. high; and are individually designed for 160 lb. working pressure.

Both vessels were X-rayed and stress relieved; and were built in accordance with the ASME Code, Paragraph U-68.

In each case, the digester shell is 1 11/32 in. in thickness; the bottom cone, 1 11/32 in.; and the top head, 1 5/16 in.

There is an FMP circulating system for each digester. Each system includes a liquor circulating pump, a circular strainer, a distributing ring, and necessary connecting piping and fittings.

Certain parts of each liquor circulating pump are of chrome nickel steel. Both the packing box and shaft of each unit are water-cooled. Likewise, each pump is direct-connected to individual motor.

Both digesters are arranged for direct steaming; both are insulated; and each is equipped with a hand-operated Yarnall-Waring blow valve.

Blow Steam Utilization

A cyclone on the roof of the diffuser room receives the blows from both digesters. This cyclone is 16 ft. in diameter by 32 ft. overall height. It is of butt-welded construction. The shell, cone and roof of the unit are of 3/8 in. plate.

Blow steam from the cyclone is piped to a catch-all on the diffuser room floor, which, in turn, is connected to a Rosenblad blow steam condenser plant.

The catch-all, a unit 8 ft. in diameter by 15 ft. high, is for the purpose of retaining such fiber as is carried over with the blow steam. This fiber is removed periodically through a valve installed in the apex of its cone-shaped bottom. The valve discharges directly into a hand-operated box-type truck that is placed beneath the catch-all to receive the fiber.

The Rosenblad blow steam condenser plant includes a jet condenser, an accumulator, two Rosenblad spiral heat exchangers, and a storage tank for clean, hot water.

In operation, blow steam from the catch-all enters the jet condenser. There it is brought directly in contact with cold, blow-steam contaminated water which is pumped to it from the bottom of the accumulator or directly from the Rosenblad spiral heat exchangers. Automatic regulation controls the supply.

The hot blow-steam contaminated water resulting from the condensing operation flows by gravity into the top of the accumulator. This water, in turn, is pumped to the Rosenblad spiral heat exchangers where it heats clean, cold water, the clean hot water being delivered to the storage tank prior to use in pulp washing; the cold blow-steam contaminated water being delivered to the bottom of the accumulator or directly to the jet condenser.

Pulp Washing

Pulp entering the cyclone drops by gravity through a swivel piping connection into any one of six diffusers. A quick coupling at the discharge end of the swivel piping permits connection to be made with the top head of the diffuser being charged. Likewise, the piping is arranged on adjustable supports which are raised or lowered with an electric motor. The entire arrangement swings in a half circle to conform to the diffuser layout.

Each of the diffusers is of butt-welded construction; is designed for 35 lb. working pressure; is 14 ft. 6 in. in diameter by 33 ft. 4 in. high; and is equipped with a false bottom. The pulp capacity of each diffuser is 4600 cubic feet. Stock in the diffusers is washed straight down.

The half-circle arrangement of diffusers is positioned on the top of a rectangular-shaped, concrete diffuser chest in the conventional manner. A heavy wooden grating of ample proportions in the top of the chest allows the stock to be sluiced into the chest as it is discharged from the diffusers. Circulation of stock in the chest is accomplished through the use of four Dilts agitators which are located in pairs at diagonally opposite ends of the chest.

Screening and Thickening of Pulp

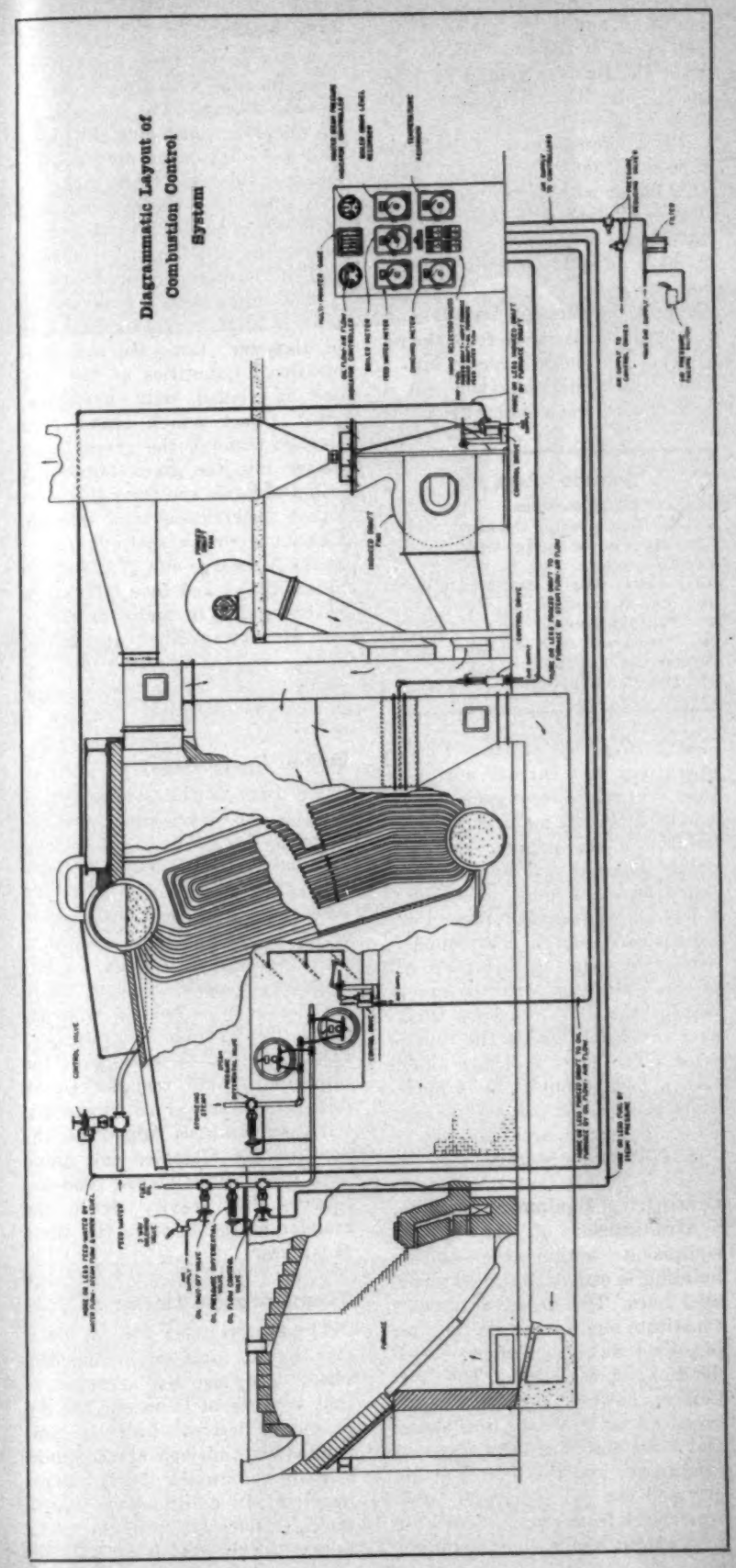
Major screen room equipment includes three Impco knotters, four Impco centrifugal screens, and two Impco vacuum deckers. There is an individual line-grouping of the knotters, the screens, and the deckers, the three lines thus formed being arranged parallel to each other and in step arrangement to permit gravity flow from the knotters to the screens, and, in turn, from the screens to the deckers.

Stock from the diffuser chest is delivered to three head boxes. There is a head box for each knotter. Such an arrangement permits ready and simple control of stock flow.

Each knotter, likewise, is equipped with 1/2 in. perforated steel plates; operates at 25 r. p. m.; and is driven through an integrally-built, worm-reduction unit which is operated by a 2 hp., splash-proof, direct-connected motor.

A single flume receives the accepted stock from the knotters and discharges it to three of the four screens in the line, the fourth screen serving as a tailings screen for these three units. Likewise, the layout is such that any one of the three units can be cut out of service, if desired, and used as a stand-by.

All of the four screens, designated as Design No. 4 units, are equipped with screen plates with



.125 in. perforations. They also are individually equipped with a motor and V-belt drive, and have an operating speed of approximately 365 r. p. m.

Each of the two Impco vacuum deckers has a cylinder mould with a diameter and a face of 8 ft. They also are individually equipped with a 7½ hp. motor and with a barometric leg for the production of required vacuum.

These machines serve the dual purpose of deckering the screened stock and of recovering the fiber in the white water from a pulp drying machine. The pulp drying machine, in turn, receives the thickened decker stock for final felting, drying and cutting into pulp sheets after it passes from the deckers into a stock chest for the creation of a reserve supply. The chest, of concrete construction and equipped with a single Dilts agitator, is positioned on the ground floor of the screen room.

Related Screen Room Equipment

Other equipment directly related to the functioning of the screen room includes an Impco slusher thickener, a comparatively small stock chest, and a Dilts Hydrafiner. The slusher thickener is for the purpose of de-watering the knotter rejects and the rejects from the tailing screen; the stock chest for storing the thickened stock rejects; and the Dilts Hydrafiner for refining them.

The slusher thickener has a cylinder mould with a diameter of 36 in. and a face of 84 in.; a vat of wood construction; and an individual motor drive for the cylinder mould. The motor of this drive operates through a worm gear speed reducer and a spur gear arrangement which together give the cylinder mould an operating speed of about 15 r. p. m.

The stock chest is of wood construction. It is of the vertical type, open at the top and is equipped with a New England Tank & Tower vertical agitator.

The de-watered stock rejects, after refining in the Dilts Hydrafiner, again enter the regular cycle of operations by being returned to the diffuser chest.

Storage of Black Liquor

Black liquor removed from the stock during the washing operations in the diffusers is stored in one of two black liquor storage tanks previous to concentration. Each of these storage tanks, fabricated by Chicago Bridge & Iron Co., has a ½ in. shell and a 3/16 in. umbrella roof; is of butt-welded construction; and has a diameter of 33 ft. and a height of 13 ft. 6 in.

Black Liquor Evaporation

Concentration of the black liquor is accomplished in a five-body quadruple effect Swenson evaporator. This evaporator has a capacity for concentrating the black liquor from 120 tons of pulp a day from 17 per cent to 55 per cent total solids. It has a total heating surface of 12,000 square feet. Bodies and tubes are of welded steel.

Flow of liquor through the various effects is from the last to the first. Steam flow is in reverse order. The first effect receives steam at about 25 lb. pressure; while the last effect is under about 25½ in. of vacuum.

The concentrated liquor from the evaporator, delivered to a concentrated black liquor storage tank, and later mixed with necessary quantity of salt cake to make up for the loss of alkali during the cycle of operations, is fed into a B & W-Tomlinson recovery unit.

Black Liquor Recovery Unit

This unit consists of a B & W 3-drum waste heat boiler which is equipped with water-cooled furnace walls, superheater and air heater.

The fully studded area of the furnace walls is 1280 sq. ft.; the partially studded area, 820 sq. ft.; and the bare tube area, 225 sq. ft.

The superheater is of the inverted loop-tube type, designed to give a total steam temperature of 725 deg. Fahr. at a rating of 47,600 lb. of steam per hour.

The air heater is of the welded-element type and has a heating surface of 6360 sq. ft. It is designed to give a final air temperature of 363 deg. Fahr. at maximum rating.

The boiler is designed for 650 lb. per sq. in. and to operate at 615 lb. per sq. in. at the superheater outlet. The furnace volume is 5,000 cu. ft.; and the boiler heating surface, 8,200 sq. ft.

Black liquor capacity of the unit is 27,200 lb. per hour, based on a liquor with 55 per cent solids. The equivalent pulp production is 130.5 tons a day on a basis of 2,750 lb. of solids per ton of pulp.

General Causticizing Details

The smelt discharge from the recovery unit flows directly into a single dissolving tank where it is mixed with weak liquor from the causticizing operations. These operations are carried out in a Dorr continuous recausticizing system in which the major equipment includes a green liquor heater, a green liquor distribution tank, a lime feed bin, a rotary lime slaker, a Dorr bowl classifier, three Dorr causticizers, and a five-compartment Dorr washing thickener. All of this equipment with the exception of the Dorr washing thickener is located within the caustic room. The Dorr washing thickener is located out-of-doors immediately adjacent to the caustic building in the area between it and black liquor storage.

Legends—Page 165

12—Battery of diffusers.
13—(a) Dorr washing thickener, (b and c) Black liquor storage tanks.
14—The cyclone.
15—General view of causticizing plant.
16—Line of knotters.
17—Pulp thickeners.
18—Novel view of black liquor evaporator installation.
19—Installation of screens.

Causticizing Equipment Layout

Arrangement of the major equipment within the caustic building is essentially in two parallel lines. The three causticizers constitute one line, while the lime bin, lime slaker, and bowl classifier make up the second. The causticizers, however, are located on ground floor level; the lime slaker and bowl classifier on a concrete mezzanine; and the lime feed bin elevated on a structural steel framework from ground floor level to a height above the mezzanine.

Lime Slaking

A Rex bucket type elevator supplies the bin with lime from adjoining storage. The bin is 18 ft. in diameter; has straight sides; and a 45 deg. cone bottom. The straight sides are 11 ft. high.

A Ross chain feeder and a helicoid conveyor connect the bottom of the lime feed bin with the inlet end of the lime slaking unit.

The lime slaker, a Kilby rotary unit, is 24 ft. long and 6 ft. 6 in. in diameter. Lime fed into it in measured quantities at the inlet end is slaked with unclarified green liquor which passes from storage through the green liquor heater into the green liquor distribution tank and from the green liquor distribution tank into the slaker. A rotary scalping screen at the discharge end of the slaker passes the slaked lime but rejects particles of ½ in. and over. There also is a steam hood at the discharge end of the unit for discharging the vapor which arises during the operation.

Milk-of-Lime Classifying

The Dorr bowl classifier, which receives the slaked lime from the slaker, is 3 ft. wide and 25 ft. long and has a 10 ft. diameter bowl. Settleable impurities in the slaked lime, impurities such as unburned cores, sand, and pebbles, are raked up the inclined trough of the classifier, washed in their travel with a spray of hot water to recover any desirable materials, and are discharged to waste over the top end of the trough. Green liquor from the green liquor distribution tank is added to the bowl of the classifier and along with the clarified slaked lime discharges by gravity from the launder of the bowl to the three causticizers.

Causticizing and Thickening

These units, each 9 ft. in diameter by 9 ft. high, are arranged in series. They are also arranged so that any one of them may be bypassed, if desired. Likewise, suspended within each of the tanks is a 34 in. duplex Turbo Mixer impeller. In addition, there is a piping connection with the green liquor distribution tank so that

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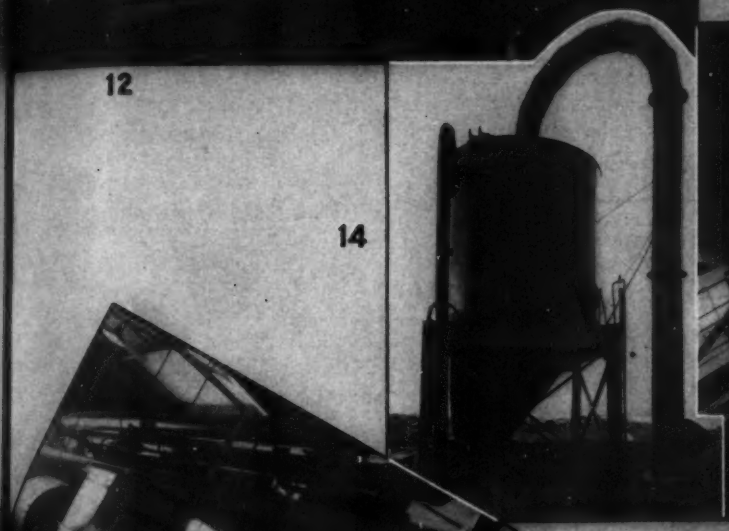

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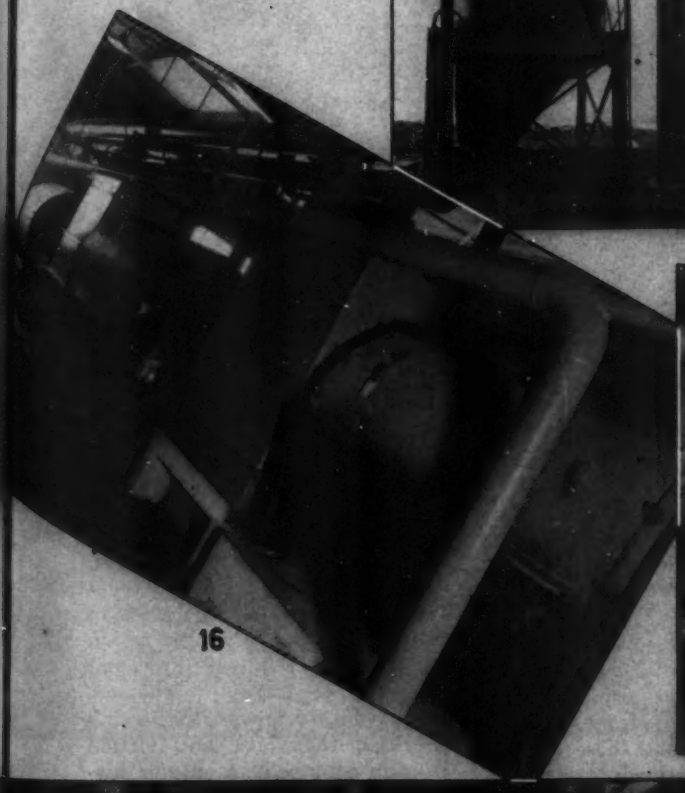

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green liquor may be fed directly to the causticizers.

The causticized liquor carrying the lime mud is pumped from the causticizers to the top compartment of the Dorr washing thickener for lime mud separation. This thickener, providing one decantation and four counter-current washes, is 35 ft. in diameter and has a depth of 32 ft. Strong white liquor is decanted continuously through the launder of its top compartment; while weak liquor is withdrawn from the compartment directly beneath it. Likewise, there is continuous removal of the lime mud. This removal is made from the underflow of the bottom compartment. It is accomplished through the use of one of two Dorreo pumps, the second pump always serving as a stand-by.

A vertical shaft carries the interior operating mechanism of the thickener. This shaft is driven by a worm gear assembly which is carried on ball-bearing unit, the ball race of which is about 4 in. in diameter. There also is a fully-enclosed, overload alarm and motor cut-out mechanism which protects the thickener against overloads of any kind, operating or accidental.

Liquor Storage

Both the strong white liquor and the weak white liquor pass from the thickener to storage. The lime mud, on the other hand, passes to waste.

There are two storage tanks for the strong white liquor and one for the weak white liquor. There also is one storage tank for green liquor. These four tanks are grouped conveniently in a straight line along one side of an enclosed passageway that connects the caustic plant with the digester house and the rest of the mill; while the black liquor storage tanks and the lime mud thickener are in the area immediately on the other side of this same passageway.

Fourdrinier Pulp Drying Machine

The pulp drying machine is a 136 in. Beloit fourdrinier.

Its fourdrinier part, designed for a wire 136 in. wide and 70 ft. long, is equipped with double adjustable slices, 40 5-in. brass table rolls, 5 7-in. suction boxes with hard maple covers, a 40-mesh wire, a Gilbert & Nash wire guide, a 12-in. dandy roll; and a Beloit rubber-covered suction couch with a rubber-covered wringer or pressure roll. The breast roll, table rolls, wire rolls and couch roll are equipped with anti-friction bearings. Flat boxes are connected to a Nash flat box unit. A Nash Hytor vacuum unit of the conical type serves the suction couch. It is connected to the couch through a hollow section of the front supporting stand. A portion of this stand is removable for convenience when putting on a new wire.

Legends—Page 167

20—Boiler room.
21—Turbo-generators (Westinghouse).
22—Boiler feed-water filter installation.
23—Deep well pump which meets entire water requirements of mill.
24—Pulp drying machine from dry end.
25—General view of laboratory.
26—Weighing, pressing, tying and transporting of pulp bales.

There are three presses on the machine.

The first of these presses is a Beloit suction press. This press is mounted in anti-friction bearings and is supplied with a gun metal covered top roll. It also is connected to a Nash Hytor vacuum pump through a front suction connection.

A plain rubber covered bottom roll and gun metal covered top roll make up the second press. This press is followed by two preheating dryers, and these dryers, in turn by the third press. The third press also includes a rubber-covered bottom roll and a gun metal covered top roll, as in case of the second press, but the rolls of the third press are designed for higher nip pressures.

All felt rolls of the three presses are carried in anti-friction bearings.

The dryer section includes 70 48-in. diameter dryers. These dryers, supported in enclosed bearings and equipped with machine cut gears and oilless balanced steam joints, are arranged vertically in eight stacks. There are 10 dryers in each of the first six stacks; 6 dryers in the seventh, and 4 in the eighth or last stack.

A Bowser automatic lubricating and filtering system, a Sheahan rope carrier, a Ross removable panel hood, and a system of footwalks and ladders complete the dryer section.

The hood over the machine is split up into four sections, each section making a complete bay. Each individual portion of the hood is equipped with an exhaust fan of the ventilator type. These fans are located just above the roof level.

Air is supplied to the machine by means of the dryer frames, which are hollow, and by means of distributing nozzles. There also is an air system for the roof.

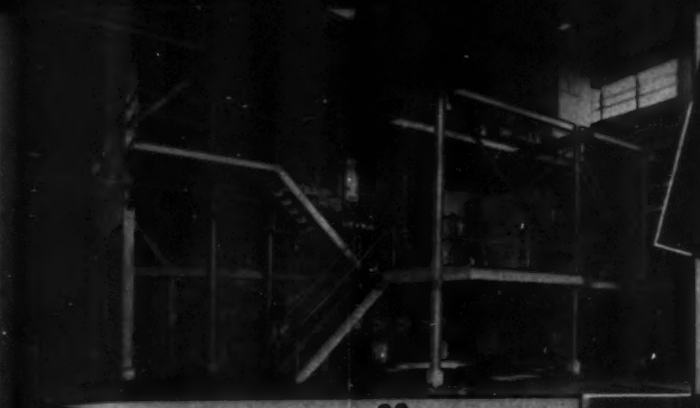
A Type S Midwest-Fulton dryer drainage system serves the dryer section. This equipment is located in a pit on the back side of the machine.

Drive Arrangement of Pulp Drying Machine

Spiral bevel enclosed drive stands connect the machine through a flat belt drive arrangement with an overhead line shaft that is driven by a single motor. The gears of the drive stands are totally enclosed; are mounted in anti-friction bearings; and operate in a bath of oil. A flexible coupling connects each in-driving shaft to its corresponding machine section; while power application to the section is controlled through an automotive-type mechanical clutch. Pillow blocks, supporting the line shaft are anti-friction bearing equipped. A shorter center belt drive connects the line shaft with the motor. The motor, also positioned overhead, is attached to a Rockwood Drive base.

Finishing Equipment Particulars

The dryer section is followed with a Beloit pulp cutter and a Mathews Conveyor layboy and conveyor arrangement. The pulp cutter, provided with a duplex slitter arrangement, reduces the



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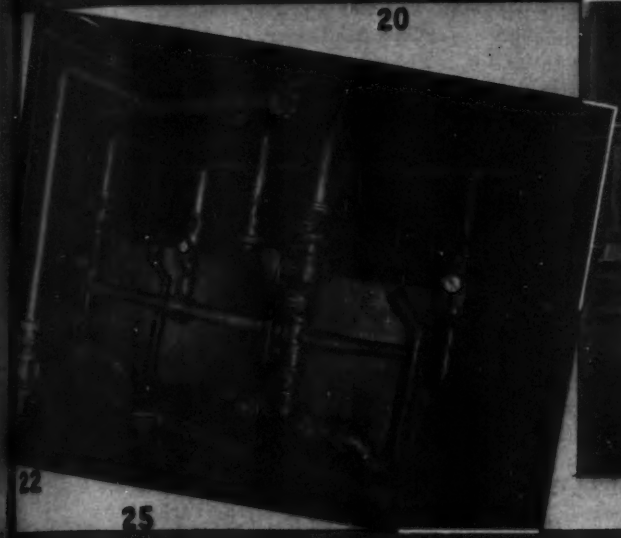

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pulp sheet as it emerges continuously from the dryer section into sheets about 29½ in. by 32 in. These sheets, as ejected from the cutter, are stacked in piles, the layboy being installed for the purpose, and the piles transferred to a wheel type pallet conveyor. This conveyor, with its wheels mounted so that the piles may be rolled from it at right angles to the direction of travel, delivers the piles to a wheel conveyor which extends forward and at right angles from the inside front end of it. In the line of this wheel conveyor is a Fairbanks scale upon which each pile of pulp sheets is weighed before being delivered to a 600-ton Baldwin - Southwark hydraulic pulp press. Slight adjustment as to the number of sheets in the individual pile is made on the scale so that the average pile as delivered to the pulp press from it weighs approximately 400 lb.

The pulp press is a self-contained, oil-operated press of the quick closing and pressing type. It is equipped with a Cavin type conveyor. This conveyor makes use of spring mounted rollers and a flexible metal belt, an arrangement which permits for easy movement of the piles into and out of the press.

Handling of Finished Bundles

Upon leaving the press, each

compressed pile of pulp sheets is delivered to a short section of roller conveyor upon which it is wire-tied with a hand-operated Griplock wire tying device. Then the tied bundle is picked up by a J-B Sales Engineering Co. Mansaver Grab and through a ½-ton Yale electric hoist, which operates in conjunction with it, the bundle is loaded directly upon an Automatic fork-type electric-operated truck or piled on the machine room floor for later pick-up by the truck. The truck delivers the pulp directly to railroad cars spotted along the shipping platform of the machine room, or to automobile trucks which transport it to the wharf for water shipment.

Bark Burning Boiler

Such added steam as is required for process use and for power generation is produced in a B & W integral furnace boiler which is equipped with a Hofft extension furnace and arranged for combination oil and bark firing. The boiler, complete with burners, superheater and air heater, is designed for a pressure of 650 lb. per sq. in. and operates at 615 lb. per sq. in.

The burners are B & W circular combination burners for oil and future pulverized coal firing. The superheater is of the inverted tube type and the air heater of the B & W welded element type.

The superheater is designed to give 750 deg. Fahr, total steam temperature at 76,200 lb. of steam per hour, the maximum capacity of the boiler. Of this maximum capacity, 45,000 lb. are attributed to barking firing and 31,200 lb. to oil.

The air heater has a heating surface of 3,410 sq. ft. and is designed to give a final air temperature of 298 deg. Fahr. at maximum rating.

The furnace volume is 4056 cu. ft.; and the boiler heating surface, 8825 sq. ft.

The bark and wood refuse in the discharge hopper within the boiler plant, delivered there from the wood preparing operations, serves as fuel for the Hofft extension furnace.

Other Boiler Plant Data

A chimney of the radial brick type serves both boilers. It is 250 ft. high; 21 ft. in outside diameter at the bottom; and 12 ft. inside diameter at the top. The base of the chimney is located within the boiler room of the boiler in which both bark and oil are used for fuel.

Both boilers are equipped with Bailey combustion control instruments. There also is a Bailey three-element control system for the bark-and oil-fired boiler. This system regulates feedwater input to steam output.

In addition, process steam is conditioned by two Bailey pressure reducing stations and by a Bailey de-superheat control system. Then, too, Bailey meters are used to measure steam supply to turbine, steam supply to main pressure reducing valve; steam supply to evaporator, steam supply to feedwater heater, steam supply to pulp drying machine; steam supply for causticizing, turbine bleed, boiler make-up water, well water, condensate from surface condenser, and steam supply to auxiliary header. The meter which measures the steam supply to turbine also records pressure and temperature.

Boiler Feed Water Treatment

Water for boiler feed is softened in a Cochrane hot process softener of the standard type; subsequently filtered through two Cochrane filters: and then passed through a Cochrane de-aerating heater prior to delivery. The softener has a capacity of 12,000 gal. per hr.; the filters, 8,000 gals. each at a maximum pressure of 50 lb. per sq. in.; and the de-aerating heater, of 150,000 lb. per hr.

Each filter has a diameter of 7 ft. 6 in. and is charged with non-siliceous filtering material.

Electrical Generation and Distribution

The power generating, electrical distribution and motor and control equipment is designed to handle a motor installation of approximately 4,000 horsepower.

The power generating equipment consists of a 3,000 kw. (3,750 Kv.a- at 80 per cent power factor) Westinghouse automatic single bleeder condensing turbo-generator.

The turbine is designed to operate at 590 lb. steam pressure with 225 deg. Fahr. superheat at the throttle. Its bleed point is at 25 lb. gauge. Steam, which is not bled, is condensed at 28 in. of vacuum in a 1,000 sq. ft. Westinghouse surface condenser.

The generator is wound for 3 phase, 2,400 volts, 60 cycles; and is equipped with direct connected exciter and generator air cooler.

Electric distribution is a 2,400 volts for the larger motors (60 hp. and above) and at 440 volts for the smaller motors (50 hp. and below). The lower voltage is obtained through a power transformer bank.

The switchgear, also of Westinghouse design, consists of an eleven panel cubicle type switchboard. This switchboard is made up of seven 2,400 volt panels and four 440 volt panels. The 2,400 volt panels control the turbo-generator, power transformer bank and five power feeders. Six 440 volt feeders are controlled by the 440 volt panels.

There are approximately 150 motors with a total rating of about 3,500 hp. in the mill. All of these motors, except for a very few, are Westinghouse. Most of them are of the splash drip-proof, squirrel-cage type. Some are totally enclosed. Gearmotors are used on a number of conveyors.

All motors of 150 hp. capacity or smaller are started at full voltage. Larger motors are started on reduced voltage. Starters for all of them are electrically controlled by means of push buttons.

Power for lighting and miscellaneous service, in case of mill shut-downs and emergencies, is supplied by the local municipal power company. There is a tie-line for such transmission.

Mill Water Supply

Water for all process, steam generation and general purpose use is supplied by one Layne pump. This pump is installed within the mill yard and discharges directly into a rectangular-shaped concrete

reservoir which is located immediately adjacent to it.

The Layne pump has a capacity of about 3,000 gal. per min. The well which it serves is approximately 800 ft. deep. The reservoir has a capacity of 500,000 gal. and is almost entirely above ground.

A typical analysis of the water as delivered from the well into this reservoir is as follows:

	Grains per Gallon
Calcium carbonate	0.70
Calcium sulphate	12.84
Magnesium carbonate .	7.75
Silica	1.81
Iron Oxide & Alumina.	.09
Sodium sulphate	1.41
Sodium chloride	3.79
Volatile & Organic....	3.67
Total solids in solution	32.06

Machine Shop

Equipment of the machine shop, which is very centrally located in reference to the mill as a whole, includes a Marvel high speed saw, ball bearing, No. 6; a Buffalo drill press; a Brown & Sharpe No. 3A Universal Standard Type miller; an Oster-Williams auxiliary grinding tool; a Carlton radial drill (4 ft. arm on 11 in. column); a Smith & Mills 25 in. B. G. shaper; a Springfield lathe (22 in. by 20 ft.); and a Champion emery wheel grinder. The shop also is equipped with an 8-ton Reading crane which spans the entire width of the shop and operates over its full length.

Laboratory Facilities and Functioning

The mill laboratory is housed in the general office building. Approximately 750 sq. ft. of space is given over to it. This space is divided between a main laboratory, a constant humidity room, and a storeroom.

Among the most important equipment of the laboratory is a Green's standard slowness tester, a Clark's laboratory kollergang, a Hermann's British standard apparatus for pulp testing, a steam heated dryer, a Hoskin's hot plate, a Hoskin's muffle furnace, a Rochlity water still, a triple beam balance, a Freas oven, an Emerson fuel calorimeter, four William's pulp drying ovens, an American gauge tester, a Valley hot plate, a Valley sheet mould, a Christian Becker pulp balance, a Christian Becker chainomatic analytical balance, two Maurice Knight stoneware sinks, a Sturtevant No. 2 unit heater and a first aid cabinet. Pyrofax is used for Bunsen burners and other similar equipment since no city gas is available. A two-unit container of this gas is located out-of-doors, just outside the laboratory.

Within the constant humidity room, equipped with a Ross Engineering air conditioning unit, is a Thwing basis weight tester, a motor-operated Perkin's Mullen tester, and an Elmendorf tear tester.

The storeroom is stocked with a general line of chemicals, glassware and equipment.

The laboratory staff consists of eight chemists and a porter. There are two chemists on each shift in addition to the working schedule of the chief chemist and his immediate assistant.

Among the tests which are regularly made by the laboratory staff are: permanganate number of pulp; strength of pulp; consistency of stock to pulp drying machine; fiber loss determination; moisture content on chips and bark; heat value determinations on bark, fuel oil, and black liquor; complete analysis of fuel oil, salt cake, and lime; caliper of pulp sheet; moisture content of dried sheet (averages 11 per cent); and basis weight of pulp sheet. In addition, the staff makes regular routine tests on white liquor, green liquor and black liquor; checks machine speeds and steam pressure to dryers; and calculates the production in tons per hour on an air-dry basis. Tests also are made on the mill effluent in order to maintain efficient operating conditions and to minimize stream pollution.

Control of the water softening equipment and of boiler feedwater likewise is in charge of the laboratory.

Odds and Ends

Most of the pumps installed in the mill are Ingersoll-Rand units. A few Goulds pumps are installed for chemical service.

Crane valves have been widely used in the piping layout. Some Lukenheimer valves also are in evidence.

There is also an Ingersoll-Rand air compressor for meeting most of the compressed air requirements of the mill.

An elevated water tank and a ground tank for fuel oil storage are located in the mill yard. The elevated tank, 125 ft. to its bottom, has a capacity of 100,000 gallons. The capacity of the fuel oil storage tank is 7,500 barrels. Both of these tanks were erected by the Chicago Bridge & Iron Co.

Water from the elevated tank supplies a Viking sprinkler system which is installed throughout the mill.

Most of the mill buildings are integrated. The only exceptions are the wood room, salt cake storage, and office, which are separate structures.

The office building is an attractive two-story frame structure, painted white.

All of the other buildings are of brick, reinforced concrete and steel construction. In this group of buildings, however, corrugated siding has been used for temporary covering on one side of the digester house, diffuser room and screen room to permit ready expansion, if desired.

All effluent from the mill discharges through a main sewer into a reservoir which is emptied twice a day at high tide into the Amelia River. On recession of the tide, the effluent is swept into the ocean.

Engineering and Construction Responsibilities

The mill, the only pulp producing unit of the Container Corporation of America, reputedly the largest paperboard and carton manufacturing concern in the world, was designed by George F. Hardy, well-known consulting engineer to the pulp and paper industry, and was erected under the direct supervision of A. E. Drew who served Mr. Hardy as resident engineer on the job. Erection was

(Concluded on Page 185)

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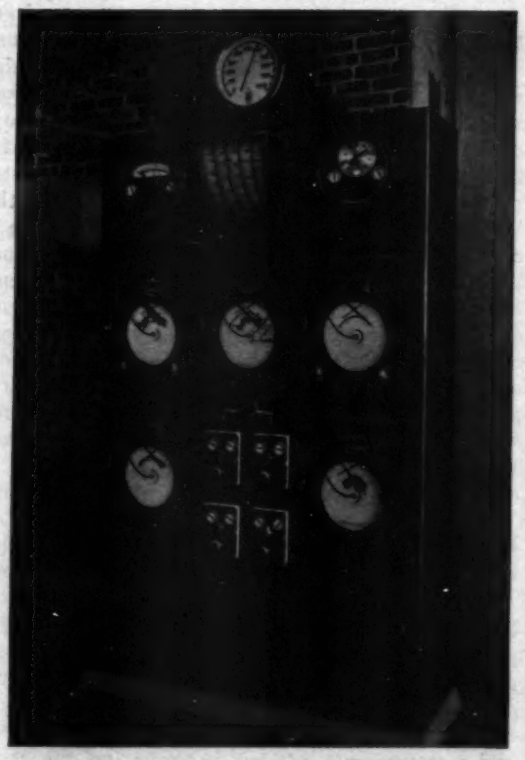

Bailey Boiler Panel for Combustion and Three-Element Feed Water Control installed on a 100,000 pound per hour capacity boiler in a Southern paper mill.

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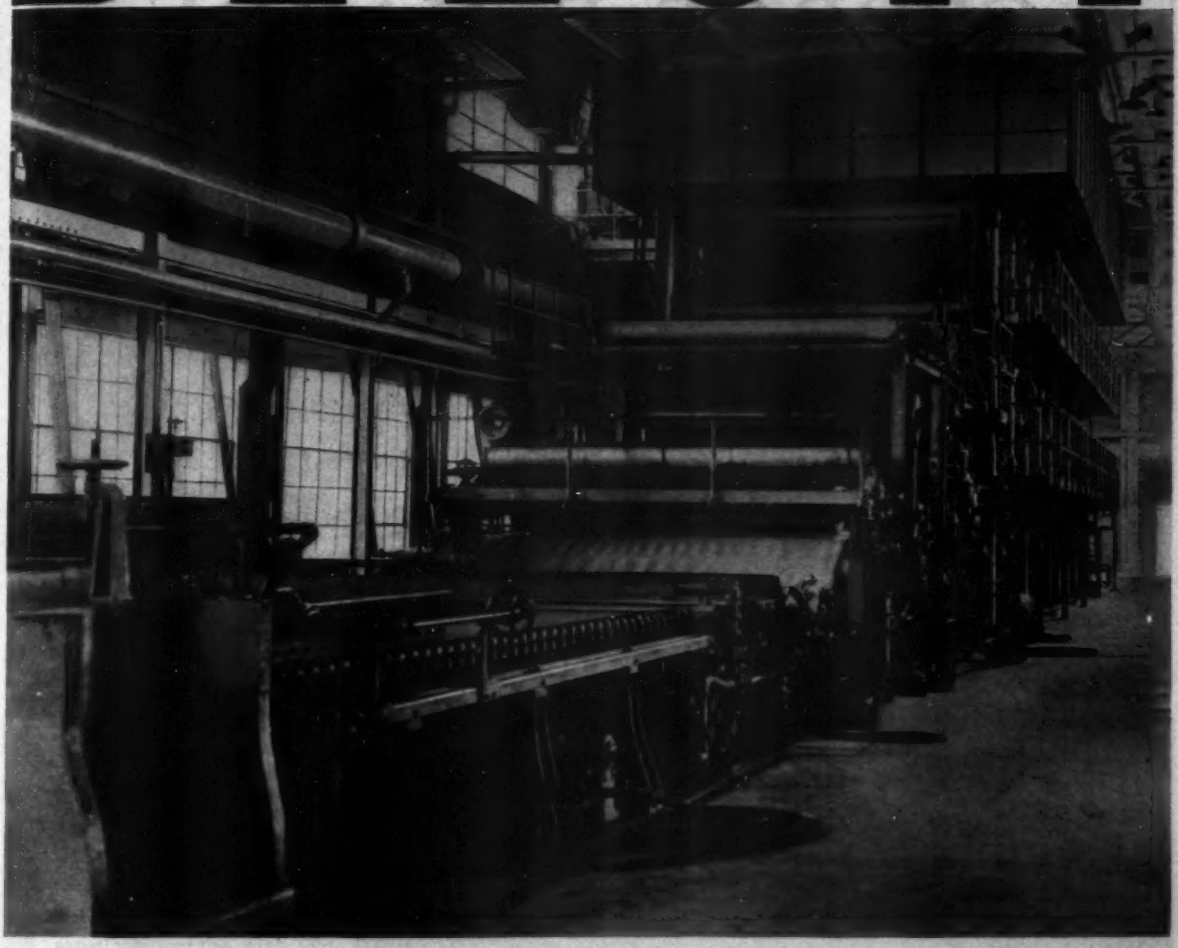

Builders of the 136" Fourdrinier Pulp Machine in the Fernandina mill of Container Corporation of America

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Brunswick Pulp & Paper Company

Brunswick, Georgia

THE Mead Corporation and the Scott Paper Company, manufacturers of non-competitive lines of papers, joined hands in the building of the new 150-ton bleached sulphate pulp mill of the Brunswick Pulp and Paper Company at Brunswick, Ga.

History of Mead Organization

The Mead Corporation dates back to 1846, in which year Colonel D. E. Mead, along with several others, organized Ellis, Clafflin & Co. in Dayton, Ohio, as a papermaking enterprise. Thirty-five years later, in 1881, Colonel Mead obtained full ownership of the concern, the company having changed its name twice in the meantime, and re-named it The Mead Paper Co.

Two of his sons, Charles D. Mead and Harry E. Mead, later took over the control of the company and in 1905, George H. Mead, son of Harry E. Mead, formed The Mead Pulp and Paper Company, and moved the plant from Dayton, Ohio, to Chillicothe, Ohio.

Under his able leadership the company, known since 1930 as The Mead Corporation, now operates mills at Chillicothe, Ohio; Kingsport, Tenn.; North Leominster, Mass.; Philadelphia, Pa.; Knoxville, Tenn.; Sylva, N. C.; Harriman, Tenn.; Nashville, Tenn.; and Lynchburg, Va.

Five of these mills, the mills in Knoxville, Sylva, Harriman, Nashville and Lynchburg, operate on tannin extracted chestnut and produce a paperboard that is used extensively as a liner and for corrugating in the manufacture of cartons as well as for other specialty purposes. Production of these five mills represents an annual combined capacity of approximately 120,000 tons.

The mills in the other four locations produce white papers and together have an annual capacity of about 150,000 tons. Much of this tonnage is book and magazine stock—both coated and uncoated. The rest of it is made up of bond and writing, envelope, bristol, cardboard, waxing and other specialties.

Scott Paper Company Growth

The Scott Paper Company also has been most successful in its operations as a manufacturer of toilet tissue and paper toweling. Its history dates back to 1910. In that year, the company placed in operation two small, slow-speed cylinder paper machines at Chester, Pa. Since that time, these two machines and four others subsequently installed have been replaced with wide high speed fourdriniers and another fourdrinier, a unit sufficiently large to increase manufacturing capacity by approximately 16 per cent, was installed during 1937.

Such growth during the little more than a quarter of a century of its corporate existence has come about primarily as a result of two things—a quality product and good merchandising. Quality has always been the keynote of its manufacturing operations, while colorful and informative advertising has always been the tool of its selling effort. The result has been an increase in annual sales volume from $726,000 in 1910 to $11,600,000 in 1936.

Fifty-Fifty Interest

Although The Mead Corporation has been a pulp producer for some years, it having a soda pulp mill in connection with the plants at Chillicothe and Kingsport and a semi-chemical pulp mill at each of the plants producing chestnut board, Scott Paper Company, joining with it in the building and operation of the Brunswick Pulp and Paper Company, becomes a manufacturer of pulp for the first time. Equal amounts of common stock in the Brunswick Pulp and Paper Company are owned by both controlling organizations and each of these controlling concerns has contracted to purchase 50 per cent of the mill's production.

Engineering and Construction

The mill, designed by O. C. Schoenwerk and erected by the Stone & Webster Engineering Corp., is the second mill to be built in the South primarily to produce bleached sulphate pulp from Southern pine. It is erected on a sand-filled site of about 10 acres that borders on the east side of Turtle River about three miles from the downtown section of Brunswick. This site, about 1,000 ft. of which fronts on the river, is part of a company-owned plot of about 274 acres.

General Mill Arrangement

Broadly speaking, the mill buildings and outside tanks are positioned in a ⊔-shaped arrangement. One leg of the ⊔ is toward the river. This leg is occupied by the wood room, barking drum installation and three salt cake storage bins. A little to the outside of this leg actually beyond the shoreline of the river, is a fuel oil storage tank of 10,000 bbl. capacity. The opposite leg, starting at the foot and in the order of positioning, is occupied by the chip storage building, causticizing plant, digester building, pulp wash-room, and screen room. Concentrated on the bottom of the ⊔ in one group is the bleach plant, machine room, laboratory and warehouse; while in a second group is the turbine building, evaporator building, recovery building and boiler plant.

Building Construction

A structural steel framework covered with corrugated asbestos siding and roofing, known as Everlasting Asbestone, constitutes the common type of construction for each of the buildings. All of the various tanks, located out-of-doors, as well as other out-

side structures, are painted with aluminum paint. The natural grayish color of the corrugated siding and roofing of the various buildings together with a silvery-grayish color of the aluminum painted structures presents a plant appearance that is both striking and neat.

Wood Preparation Equipment Data

The wood yard is literally a network of conveyors, so arranged as to permit rapid and easy movement of wood from any part of the yard to the wood preparing operations and the bark to the boiler plant.

The major wood preparing equipment includes one short leg saw-mill, one barking drum, two wood cleaners, two chippers, three chip screens, and a chip crusher. All of this equipment, with the exception of the chip screens, is of D. J. Murray Mfg. Co. design. The chip screens are of Orville-Simpson design.

Cleaning and Barking of Wood

The short log saw-mill is located out-of-doors on a log sorting deck ahead of the barking drum. Wood is delivered to the deck from the yard, and any of it with turpentine faces or otherwise blemished is sorted out. The accepted wood continues on its way to the barking room; while the wood, which has been sorted out, is delayed from doing so until its turpentine faces or other blemishes are sawed off by the saw-mill.

The barking drum, also located out-of-doors, is a 12 ft. by 45 ft. two-section unit of the Murray-Branch patented type. It operates on roller trunnions, the entire unit being erected on a solid, block-like foundation of concrete.

Wood discharged from the barking drum is inspected for any ingrown patches of bark that may not have been removed in the barking operation. All wood with such patches is removed from the conveyor system connecting the discharge end of the drum with the wood room. Another sorting deck, built integral with the conveyor system and also located out-of-doors, permits this inspection.

Located on this sorting deck are the two wood cleaners. They are used to cut away the patches of bark from all of the wood sorted out in the inspection. After removing the patches of bark, the wood is routed to the wood room.

Preparation of Chips

Within the wood room are located the two chippers, the chip screens, and crusher along with auxiliary conveying equipment.

The two chippers are set up side by side at an elevation just above that of the chip screens but not at a height sufficient to permit gravity discharge to them.

Each chipper is a 96 in. unit; is equipped with an over-size shaft, over-size roller bearings, a special steel disc, and full length lined triple anvil spout; and is direct-connected to a 250 hp., 257 r.p.m., G. E. synchronous motor.

Chip Selection and Bin Delivery

Chip discharge from both chippers is conveyed to three rotary chip chargers, one directly above the head end of each chip screen for feeding it.

The screens, each Rotex chip screeners No. 52, are set up in parallel with the head ends of the units near the wall of the wood room opposite to that where the wood enters the chipper spouts, in other words, the chippers and screens are installed back to back in relation to each other.

Each of the three screens has an upper screen surface of 5 ft. by 10 ft. 8 in.; a lower screen surface of 5 ft. by 10 ft.; and is equipped to handle 12 to 15 cords of chipped wood per hour. The clothing of each upper screen surface is a 1¾ in. clear opening .225 diameter steel wire screen; while a 6 mesh .047 in. diameter steel wire screen with a .120 in. opening is used for each bottom screen surface.

Concrete pillars and structural steel I-beams support the three screens a few feet above the wood room floor.

Oversize chips, rejected by the chip screens, are conveyed directly to the crusher. After crushing, they enter the flow of chips from the chippers to the chip screens for re-screening.

A system of belt conveyors in which is interjected a vertical bucket type elevator delivers the accepted chips from the screens to chip bin.

Chip Bin Details

This bin, located within the chip storage building, is on ground level rather than above the digesters. It is U-shaped; is of riveted plate steel construction; and has a capacity of 584 units of wood, a unit being 160 cu. ft. rather than 128 cu. ft. as in the standard cord.

The top of the bin is open except for two steel plate walkways with non-slip tread that extend the full length of the bin, one on each side of the chip delivery conveyor. A pipe guard rail is provided to the inside of each of these walkways as a safety measure.

At the bottom of the bin are a number of discharge gates through which chips are fed to a horizontal type of belt conveyor that operates directly below them. This conveyor is one of a system for furnishing chip delivery to the digesters. All of these chips are weighed previous to delivery by means of a Merrick Weightometer which is installed in connection with another conveyor of the system.

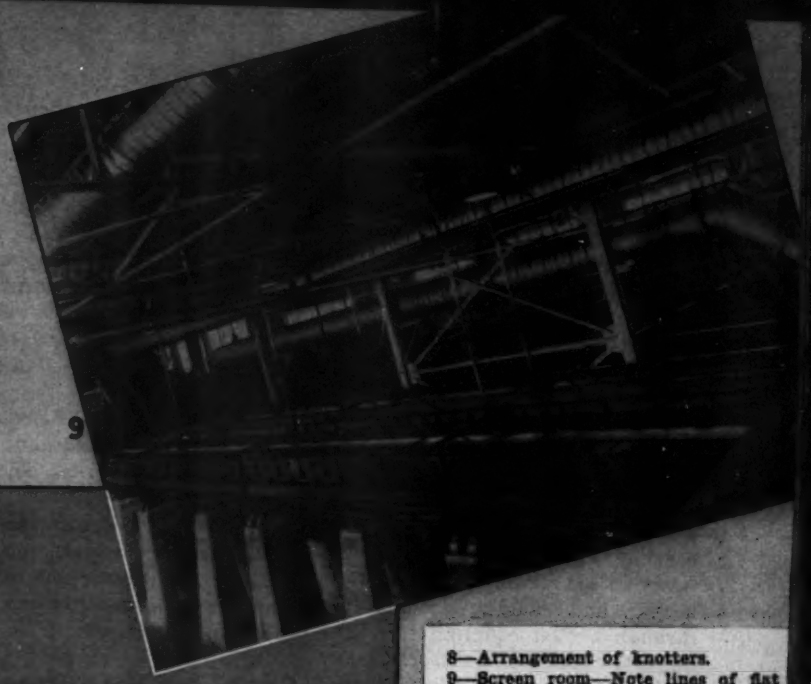
Digesters and Auxiliaries

The digester installation is made up of four Blaw-Knox digesters. Each of these digesters, designed for a working pressure of 150 lb. per sq. in., has an inside diameter of 11 ft. 2 in., a straight shell height of 34 ft. 8 in., and an overall height from the top of flange of charging manhole to face of bottom flange on conical bottom of 47 ft. 6 in. The shell and elliptical head of each digester is of firebox quality steel plate with a thickness of 1 5/32 in., while similar plate with a thickness of 1 9/32 in. is used on each conical bottom.

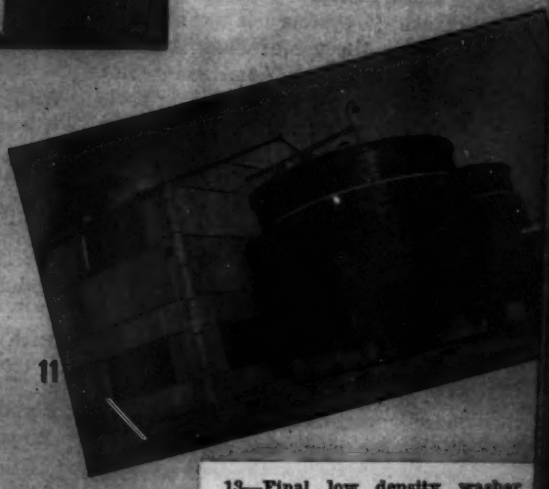
All of the digesters were constructed in accordance with the requirements of the A.S.M.E. Code for Unfired Pressure Vessels, Paragraph U-68. Main longitudinal and girth seams were X-rayed,

1—Pulpwood piled in yard.
2—Top hearth of lime sludge calcining furnace.
3—Panorama of mill shortly before completion—Note network of conveyor bridges, fuel oil storage in left foreground and three salt cake storage bins to right of elevated tank.
4—Barking drum showing discharge end and concrete foundation.
5—Digester room—Note safety tread circle about each digester.

Three chip screens in parallel—Note chip chargers and screen foundations.
Chip bin bottom showing discharge openings and receiving conveyor in system for digester delivery.



8—Arrangement of knotters.
9—Screen room—Note lines of flat screens and wide use of wood piping.
10—Liquor circulating pump, indirect heater and heater condensate trap.
11—Machine chests of tile construction located out-of-doors adjacent to wet end of pulp drying machine.
12—A vacuum filter brown stock washer.



13—Final low density washer bleach plant.

and each vessel stress relieved after welding.

The Hartford Steam Boiler & Inspection Company inspected each of the vessels after fabrication and stamped them as being in accordance with the A. S. M. E. Code requirements.

Auxiliary equipment for each digester includes an F. M. P. liquor circulating pump, an F. M. P. single pass heater, a Drammen blow valve, and necessary digester control apparatus.

The F. M. P. liquor circulating pump is an 8 in. unit. It is S. K. F. bearing equipped; has special water-cooled shaft and packing boxes; and is direct-connected through a Fast coupling to a 40 hp., 900 r.p.m., G. E. motor. Such a pump has a capacity sufficient to completely recirculate the digester liquor volume about every five minutes.

Design of the liquor heater is such that liquor cannot get in heater condensate. Should a liquor leak occur, the liquor comes to the outside.

Flow of liquor through the circulating system is controlled through the use of Pratt & Cady valves; while an Armstrong compound steam trap is used on each of the heater condensate lines.

The Drammen blow valve is a gate valve with an expanding gate, and is hand operated.

Control equipment for each digester consists of a Foxboro automatic top relief pressure controller, a Foxboro 2-pen pressure-temperature recorder, and a Foxboro steam flow recorder.

The automatic top relief pressure controller automatically relieves the digester of air and other gases which are generated during a cook. Digester pressure, through its use, is maintained at a point to correspond with digester temperature. The instrument functions throughout the entire cooking cycle.

The 2-pen pressure-temperature recorder is arranged so that excess pressure, if any exists in the digester, can be read directly from the chart.

Other instruments in the digester house, also of Foxboro design, include two Rotax recorder-controllers and a steam pressure controller.

Th two Rotax recorder-controllers, one for white liquor and one for black, function in connection with the digester liquor supply system. Each instrument automatically operates a liquor supply pump and measures and records the volume of liquor used in charging a digester.

A steel gaugeboard, complete with push buttons and pilot lights holds the instruments. They are flush-mounted on it.

Chart calibration for these instruments is in inches.

The steam pressure controller is on the steam header which feeds the four digesters.

Central Blow Line System

Each blow line of the four digesters is connected to a central blow line through the use of a Sandberg central blow valve. This Sandberg valve is a 4-way unit which allows only one digester blow line to be discharging into the central blow line at a time. In other words, when one digester blow line is discharging the other three lines are shut off.

The central blow line connects with an elevated blow tank that is located just outside the digester building. This structure, fabricated and erected by the Chicago Bridge & Iron Co. has an over-all height of approximately 85 ft. The tank itself has a diameter of 24 ft. and a straight side height of 14 ft. It is of butt-welded construction with an umbrella roof and conical bottom.

Handling of Digester Blow Vapors

Digester blow vapors, released from the stock in the blow tank, are delivered to a condensing system. This system incorporates the use of a special spray-type condenser, two Rosenblad heat exchangers and an accumulator tank. A hot water storage tank and a turpentine storage tank, both fabricated and erected by Chicago Bridge & Iron Co., also function in connection with it.

In operation the special spray condenser receives the blow steam, condenses it with cooled condensate from previous blows, and then the hot condensate thus formed is delivered into the top of the accumulator at a temperature of about 195 deg. Fahr. This hot condensate next is taken through the heat exchangers, where it heats clean water to a temperature of approximately 150-160 deg. Fahr. After it performs this function, it is returned to the bottom of the accumulator at a temperature of about 90 deg. Fahr. and from there it is drawn for condensing the blow steam of the next blow. The clean hot water, in turn, is delivered to storage for its subsequent use in pulp washing.

Both of the Rosenblad heat exchangers have an individual heating surface of 800 sq. ft.

Dimensions of the accumulator tank are 19 ft. by 34 ft., while those of the hot water storage tank are 16 ft. by 24 ft.

The accumulator tank is arranged vertically, out-of-doors, close to the cyclone arrangement; while the clean hot water storage tank is set up horizontally within the pulp wash-room.

The turpentine storage tank is located in the area between the digester building and the causticizing building, along with three liquor measuring tanks, likewise fabricated and erected by Chicago Bridge & Iron Co., and a number of other tanks installed in connection with the causticizing system.

The turpentine storage tank is arranged horizontally. It has a capacity of 15,000 gallons. Its diameter is 10 ft.; its length, 17 ft. 6 in.

The liquor measuring tanks are arranged vertically on legs which are 7 ft. high. Each of these tanks has a diameter of 12 ft., a height of 22 ft., a dome roof, and a cone bottom; and is made of 5/16 in. plate.

Pulp Washing

Stock, separated from the blow steam in the blow tank, is pumped to the pulp wash-room where it is washed in series on three Oliver-Young washers.

The size of the primary washer is 8 ft. by 8 ft.; the secondary washer, 8 ft. by 10 ft.; and the

third washer, 6 ft. by 8 ft. In each case, the washer tank is of steel, the drum of cast iron to which 3 per cent nickel has been added, the facing wire of stainless steel wire cloth of 36 or 40 mesh; and the winding wire of No. 12 B. & S. stainless steel wire.

The primary washer, which receives the brown stock from the blow tank, makes use of weak liquor both for washing and for diluting the washed stock as discharged from the drum into a repulper which delivers it to the secondary washer.

Fresh hot water from the hot water storage tank within the room is used on the secondary washer for washing. This washing operation is followed by another dilution of the washed stock with fresh water in a double repulper as the stock enters it from the drum and is delivered by it to the third washer.

The third washer, designated as a re-washer, also makes use of fresh water for the final washing.

A stock chest receives the washed stock from the re-washer and supplies it to three Trimbey knotters in the screen room.

Knotters and Their Operation

Each of the three knotters is equipped with a stainless steel outer shell, with stainless steel perforated plates, and with stainless steel supporting bars for the plates.

The plates of each knotter form a perforated cylinder with a cone-shaped end. On the straight section, the cylinder is 60 in. long and 39 in. in diameter; while the cone-shaped section is 23 in. long and 39 in. in diameter where it connects with the straight section.

Eight plates are used for the straight section of the cylinder and four for the cone. The perforations in the straight section plates are ¼ in. round holes; in the cone-section plate, 3/16 in. round holes.

Entrance to the knotter is through a 12 in. pipe connection opposite to the cone-shaped section of the cylinder. The screened stock outlet is at the bottom.

In operation, the lower portion of the cylinder revolves in a pond of screened stock; while screw conveyor flights, partly cast integral with the cylinder foundation frame, elevate the rejects and discharge them after a thorough washing by an internal shower at the discharge end.

The knotter rejects pass to the sewer; the accepted stock to 24 Impco 14-plate bronze vat flat screens.

Arrangement of Flat Screens

The flat screens are arranged in six lines of four units each, and in such a way that three lines function as primary screens, two as secondary, and one as tailings. All of the lines are set up on short concrete pillars, making every part of the installation easy of access, with an incline of ¼ in. per foot.

The screens are equipped with Dunbar drives, with bevel fastenings for standard 12 in. by 43 in. screen plates; and with Crodon plated William A. Hardy & Sons bronze screen plates. There also is a scraper over the last seven plates of the tailings line for the removal of the tailings.

Plates are .014, .012, .010, and .009 cut, Style E, 6 slots per inch.

Each line is driven through an individual direct-connected 10 hp. splash-proof gearmotor at a speed of 437 r.p.m.

The tailings, as in the case of the knotter rejects, pass to the sewer; the accepted stock to a chest and then to two 6 ft. by 8 ft. Oliver-Young deckers for concentration previous to storage in two Kalamazoo Tank & Silo Company stock tanks.

Deckers and Screen Room Pumps

The moulds of the Oliver-Young deckers have cast iron heads and trunnions and redwood staves; and are equipped with Monel wire cloth facing and winding wires. Wire cloth of 36-40 mesh is used for the facings; No. 12 B. & S. wire for the winding.

Both of the deckers are individually equipped with a Reeves drive. A similar drive is used on the Oliver-Young re-washer.

There is an individual U. S. double belt drive with 2-speed motor for both the primary and secondary Oliver-Young pulp washers.

Pumping of stock in the screen room and from the screen room to the tile chests, which are located out-of-doors in the area between the adjacent ends of the screen room and bleach plant, is accomplished through the use of a number of Bingham pumps of the vertical type. These pumps include one 6,000 g.p.m. unit for a 11.5 ft. head, two 4,300 g.p.m. units for a 25 ft. head, one 3,600 g.p.m. unit for a 12 ft. head, one 1,600 g.p.m. unit for a 12 ft. head, and two 475 g.p.m. units for a 47 ft. head. The latter two units are for the pumping of stock from the deckers to the two tile chests.

Brown Stock Chests

Both of the tile chests, positioned tangent to one another, are of double wall construction. They also are of the same size. The inside diameter of each chest is 24 ft.; the height, 20 ft. An overflow well connects the two chests at the top.

Liquor Storage

In the area between the group of buildings formed by the digester building, the pulp washroom and the screen room and the group formed by the evaporator building, recovery building, boiler plant and turbine building is a row of six tanks. These tanks include two 40 ft. by 20 ft. liquor storage tanks, a 20 ft. by 25 ft. vapor tank, two 30 ft. by 29 ft. liquor storage tanks, and a 15 ft. by 15 ft. caustic liquor tank. There also are two 10 ft. by 12 ft. hot black liquor tanks which are located immediately contiguous to one end of the evaporator building. All of these tanks were fabricated and erected by the Chicago Bridge & Iron Company.

Evaporator Characteristics

Within the evaporator building is a 6-body quintuple LTV Swenson evaporator for the concentration of the black liquor. This evaporator has a total heating surface of 20,700 sq. ft. It has bodies and tubes of welded steel. Liquor flow through the unit is in reverse to that of the steam which enters the

first effect with a pressure of about 35 lb. Vacuum on the last effect approximates 25 in. The evaporator has been designed to concentrate the black liquor of a 150-ton daily production from 16 per cent to 55 per cent total solids.

Control instruments of Foxboro design in the evaporator room include two temperature controllers, one pressure controller, one steam flow recorder, five 2-pen recording gauges, and a flow controller. All of the instruments are mounted flush on a steel gauge-board; and the controllers, in addition, are complete with Stabilflo valves.

The Recovery Unit

The concentrated liquor produced by the evaporator unit is delivered to a B & W-Tomlinson recovery unit in the recovery building. Essential features of this B & W-Tomlinson unit include a boiler, a superheater, an economizer, an air heater, a water-cooled furnace, a spray tower, a dissolving tank, a mixing tank, green liquor and black liquor pumps, forced draft and induced draft fans, flues and ducts, and Bailey metering equipment.

The boiler is of the three-drum waste heat type with a heating surface of 9,672 sq. ft., an operating pressure of 445 lb. per sq. in., and a steam production of 65,300 lb. per hour.

The superheater is of the B & W loop-tube type; the economizer, of the B & W return-bend loop-tube type; and the air heater, of the B & W welded element type.

The mixing tank furnishes a means of mixing the black liquor with the necessary quantity of salt cake, to make up for the loss of alkali in the cycle of operations, previous to incineration of the black liquor and incident reduction of salt cake to sodium sulphide within the recovery furnace.

Storing and Handling of Salt Cake

Each of the three salt cake storage bins, from which the salt cake is obtained, has a diameter of 30 ft., a high pitch cone roof, and a cone bottom; and is supported by six posts. The bottom of each bin discharge is about 3 ft. above ground level.

These bins, fabricated and erected by the Chicago Bridge & Iron Co., have an individual capacity of about 830 tons of salt cake.

Elevating and conveying equipment for delivering in-coming shipments of salt cake into the bins and for transporting this salt cake to the recovery building are of Link-Belt design.

Green Liquor Preparation

Smelt, issuing from the recovery furnace, drops by gravity into the dissolving tank where it is mixed with weak white liquor from the causticizing operations to form strong green liquor. This liquor, delivered to storage in a 15 ft. by 15 ft. tank, is subsequently clarified, and then heated to a temperature of 210-215 deg. Fahr. by means of a 12 in. by 48 in. Alco liquor heater prior to passing to a 9 ft. by 9 ft. balance tank from which it is causticized with lime.

Legends—Page 181

14—Vacuum pump in felt conditioning roll service.

15—Vacuum pump installation on wet end of machine.

16—Six-inch centrifugal handling bleached stock from machine chest.

17—Pressure lubricating and filtering system installed behind dryer section of pulp drying machine.

18—Dryer section of fourdrinier machine showing third press.

Major Items of Causticizing System

The causticizing operations are performed in a Dorr continuous causticizing system. This system, in addition to the Alco heater and the green liquor balance tank, employs two lime storage bins, two Ross chain feeders, a Kilby slaker, a bowl classifier, three causticizers, two white liquor storage tanks, a lime mud thickener, and two weak liquor storage tanks.

Lime Storage

One of the lime storage bins is for new lime; the other for reburned lime. The bin for new lime receives its supply from an outside storage bin; while the other is filled with re-calcined lime sludge.

The outside storage bin has a capacity of about 300 tons of dry lime. It is 20 ft. in diameter and 34 ft. high; and is of plate steel construction with a cone bottom and a umbrella roof. Both the shell and bottom of the bin, which was fabricated and erected by the Chicago Bridge & Iron Co., are of ¼ in. plate. The roof is of 3/16 in. plate.

Each of the lime storage bins of the Dorr system has a diameter and straight side height of 12 ft. and a 60 deg. cone bottom.

Slaking Procedure

The two Ross chain feeders, one for each of the two lime bins, delivers the lime from the bins to a screw conveyor which discharges it to the Kilby slaker. The Kilby slaker is a 6 ft. by 24 ft. unit which operates at 3 r.p.m.

Raw lime enters the slaker cold. There it meets the strong green liquor from the balance tank at a temperature close to the boiling point and in sufficient volume not only to slake it, but to dilute it somewhat.

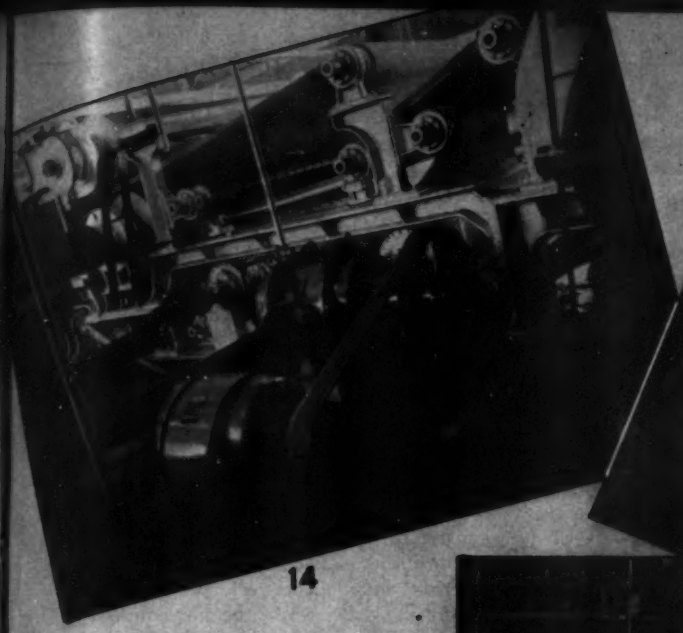
Classifying of Milk-of-Lime

The slaker discharges to the bowl classifier where more green liquor is added to make the resultant liquor dilute enough for good classification. Sand, grit and pieces of inert material are removed by the classifier and discharged to waste. The classifier is an 18 in. by 24 ft. unit with a 4 ft. bowl.

A sump tank, 4 ft. in diameter and 4 ft. high, receives the milk-of-lime overflow from the classifier and supplies it to the first of the three causticizers. This causticizer likewise is supplied with a certain amount of green liquor.

Causticizer Arrangement

The three causticizers, each of which has a size of 9 ft. by 8 ft. 6 in. and is equipped with a Turbo-Mixer agitator, are arranged in series. Liquor overflow is from the first to the second, and from the second to the third; but by-pass connections make it possible to cut out any unit.



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White Liquor Clarification

Finished slurry from the causticizers, all of the previous causticizing equipment being located within the causticizing building, is delivered to the white liquor clarifier which is located out-of-doors. This clarifier is of the two-tray type, and has a size of 20 ft. by 14 ft.

Clear white liquor overflow from the clarifier is delivered to the two white liquor storage tanks where it is held until needed for cooking. Lime mud, on the other hand, is pumped from the bottom of the clarifier to the thickener.

Each of the white liquor storage tanks has a diameter and height of 20 ft.

Lime Mud Thickener

A greater part of the necessary total liquor volume is made up by adding water to the lime mud on its way to the thickener. The thickener, like the clarifier, is of the two-tray type and is of the same size. Both its clear liquor overflow and its lime mud underflow pass to storage, the clear liquor overflow to the two weak liquor storage tanks, each of which has a diameter and height of 15 ft., and the lime mud to a 9 ft. by 9 ft. storage tank. It is this weak liquor that serves as the source of liquor sup-

ply for the dissolving tank; while the lime mud, after further concentration is calcined for re-use in the causticizing of the green liquor.

Control of Causticising Operation

Control instruments, installed in connection with the Dorr causticizing system, in addition to liquid level gauges, include a steam flow recorder, a liquor flow recorder-controller and a temperature recorder-controller. All of these instruments are flush mounted on a steel gaugeboard. They are of Foxboro design.

Lime Mud Filter

Further concentration of the lime is accomplished on an Oliver continuous filter located within the causticizing building. The drum size of this filter is 6 ft. by 3 ft. Both the drum and tank are of cast iron. Stainless steel wire cloth is used for the drum cover and stainless steel wire for the winding.

Wash water is sprayed on the cake as it is being concentrated on the filter drum to wash out possible white liquor. This water, mixed with the filtrate, is returned to the thickener. The filter cake, on the other hand, is discharged to a Nichols-Herreschoff furnace.

Details of Calcining Furnace

This furnace, which is positioned directly below the filter, has an outside diameter of 16 ft. 9 in. and an over-all height of about 34 ft. It is equipped with 10 internal hearths and a top drying hearth. The shell is of steel plate, lined with 9 in. of insulating brick and 4½ in. of firebrick. Special firebrick shapes are used for the arches.

Sludge enters the furnace near the center of the top dry hearth. Rabble arms equipped with teeth and attached to a central revolving shaft move it across the hearth to feed openings through which it drops into the first internal hearth. In similar manner, it is moved across and down through the various hearths until discharged from an outlet in the bottom hearth.

Various hearths are equipped with oil burners, but most of the firing is carried out on the lower ones. The maximum temperature required for completing the calcination ranges between 1700 and 1800 deg. Fahr.

A Jeffrey scraper conveyor and bucket elevator arrangement delivers the calcinated material into the storage bin for reburned lime.

Other Steam Generating Equipment

In the boiler plant, adjoining the recovery building, are two B & W integral-furnace boilers, each with a superheater, a Hofft bark burning extension furnace, three B & W fuel oil burners, and Bailey metering equipment. There also is a B. F. Sturtevant fan for forced draft and one for induced draft on each boiler.

Both boilers are controlled automatically and are equipped with a Bailey recorder controller.

Each boiler has a heating surface of 12,367 sq. ft., an operating pressure of 450 lb. per sq. in., and a maximum capacity of 80,000 lb. of steam per hour.

The superheater of each boiler is of the B & W loop-tube type and, with combination oil and bark fuel firing, is designed to give a total steam temperature of 710 deg. Fahr.

Boiler Feedwater Treatment

All boiler feedwater is treated in a Cochrane deaerating type hot process softener. The softener is capable of heating, softening and deaerating 12,000 gallons of make-up water per hour. It is designed to receive condensate which is preheated and deaerated along with the filtered softened water. The total deaerating or outlet capacity is 150,000 lb. per hour.

In operating the equipment, raw water first is heated by means of a jet type heater. Then the softening chemicals are added, and, after settling, the water leaves the deaerator through an uptake funnel. The water next is filtered through two 7 ft. 6 in. filters supplied with a non-siliceous filtering material. After filtration, the filtered water returns to the sedimentation tank and there joins the preheated condensate where the combination of treated water with condensate is deaerated by means of an atomizer. After deaeration is completed, the water is ready for delivery to the boilers.

Hagan phosphate also is introduced intermittently into the suction of the boiler feed pump as a supplementary water treatment to precipitate residual hardness into a soft flocculent sludge.

Power Generation and Distribution

Steam from the oil and bark fired boilers as well as from the recovery boiler is delivered to a 4,000 kw., 80 per cent power factor, 3 phase, 60 cycle, 2300 volt, G. E. double automatic extraction and condensing turbo-generator in the turbine building. The bled steam from this unit meets all process requirements; while the hot condensate is returned to boiler feed. The turbo-generator is set with a direct-connected exciter; and a C. H. Wheeler condenser functions as the condenser unit.

Power distribution throughout the mill includes circuits of both 2300 volts and 440 volts. There are about 375 motors to be fed and they have a total connected load of approximately 5700 hp. The largest motor is of 250 hp.; the smallest, of 1/300 hp.

Bleaching and Storage of Bleached Stock

A Pulp Bleaching Company four-stage system is employed in the bleach plant. The stock, after bleaching, is delivered to one of two machine chests. These chests are of the same design and of the same size as the two chests for brown stock storage. They are located directly to the rear of the machine room, out-of-doors but convenient to the wet end of a Rice Barton & Fales fourdrinier pulp drying machine which they serve.

Wet End of Pulp Drying Machine

This machine has a wire 156 in. wide and 90 ft. long. Its fourdrinier part is equipped with Stowe & Woodward rubber-covered table rolls, a Beloit suction couch roll with Stowe & Woodward rubber-covered top roll, and six suction boxes. Anti-friction bearings are used on all rolls of the fourdrinier part. There also is a complete set of Monel metal save-alls and a Moore & White wire guide.

The press part is made up of

three presses. A Beloit rubber-covered suction roll is used for the bottom roll of the first press, while a plain rubber-covered bottom roll is used for each of the other two presses. The three top press rolls are gun metal covered. All of the rolls are carried in anti-friction bearings.

There is a Vickery felt conditioner on the first press felt, a suction felt roll on the second press felt, and a suction felt roll on the third press felt. The press section likewise is equipped with doctors, felt stretchers and felt guides.

Combined vacuum requirements of the fourdrinier part and the press section are met with four different vacuum pump installations. Three of these pumps are of Connersville design. They include a 10 by 15 unit, a Type R Vietor-Acme pump, and a 12 by 18 unit. The fourth installation is a Nash Hytor pump. It is a K5 unit. Likewise, a Jennings centrifugal pump functions in connection with the 12 by 18 Connersville unit.

Dryer Section and Machine Drive

Sixty 60-in. diameter dryers are included in the dryer section. These dryers are equipped with modern bearings. In addition, there is a Bowser pressure lubricating and filtering system, a Sheahan rope carrier, a size 10D Type LSM Fulton forced vapor circulating system, a Ross vapor absorption system, and a Ross Transite hood.

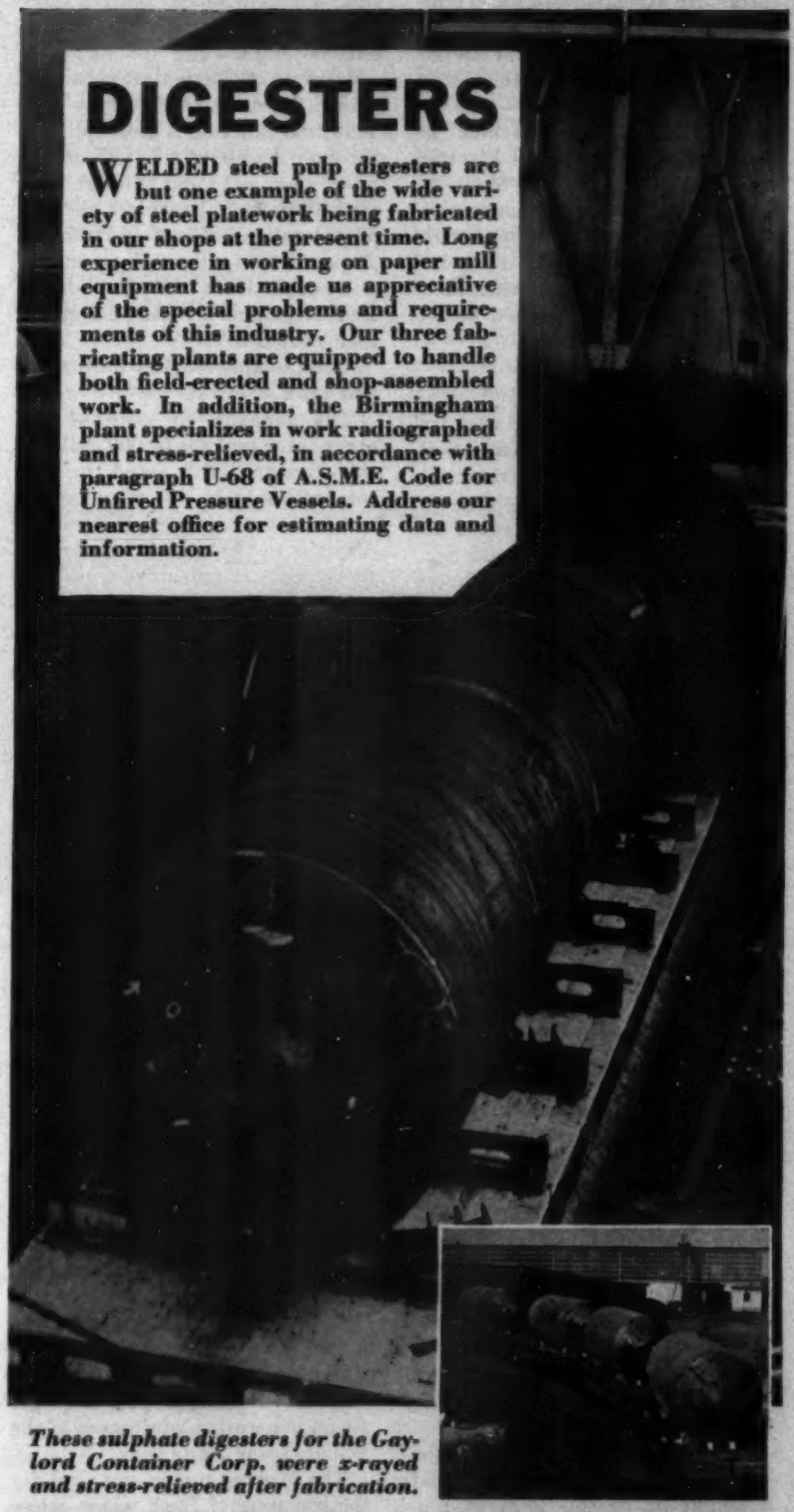
Both the Bowser pressure lubricating and filtering system and the Fulton forced vapor circulating system are positioned directly behind the dryer section, the Bowser system slightly above the level of the machine room floor, the Fulton system in a shallow pit sinking it somewhat below machine room floor level.

A central fan apparatus, also located behind the machine, supplies air to the vapor absorption system. Cross nozzles of the system extend over the full face of the dryers and are located in each dryer pocket.

Six propeller type fans serve the hood. There is an individual motor and V-belt drive for each of

DIGESTERS

WELDED steel pulp digesters are but one example of the wide variety of steel platework being fabricated in our shops at the present time. Long experience in working on paper mill equipment has made us appreciative of the special problems and requirements of this industry. Our three fabricating plants are equipped to handle both field-erected and shop-assembled work. In addition, the Birmingham plant specializes in work radiographed and stress-relieved, in accordance with paragraph U-68 of A.S.M.E. Code for Unfired Pressure Vessels. Address our nearest office for estimating data and information.



These sulphate digesters for the Gaylord Container Corp. were x-rayed and stress-relieved after fabrication.

CHICAGO BRIDGE & IRON COMPANY

Cleveland.....2267 Rockefeller Bldg.
Birmingham.....1511 North Fiftieth St.
Tulsa.....1651 Hunt Bldg.
Houston.....2919 Main Street
Detroit.....1566 Lafayette Bldg.
Philadelphia....1653-1700 Walnut Street Bldg.
Boston.....1562 Consolidated Gas Bldg.
Los Angeles.....1459 Wm. Fox Bldg.
Chicago.....2445 Old Colony Bldg.
New York.....3350-165 Broadway Bldg.
Dallas.....1446 Liberty Bank Bldg.
San Francisco.....1017 Rialto Bldg.

Plants at Birmingham, Chicago and Greenville, Pa.

them. An extended shaft and outboard bearing on each fan permits both the drive and motor to be mounted outside the path of the vapor.

The pulp drying machine is driven through a General Electric sectional electric drive. Much of the piping about the machine is of copper. It also is equipped with a Foxboro temperature recorder controller with a 14 in. controlled valve and with a Foxboro steam flow recorder.

Finishing Operations

Immediately following the dry end of the machine is a Beloit sheet cutter which delivers the pulp sheets, as cut by it, to a Mathews layboy and conveyor arrangement. The layboy and conveyor, in turn, deliver the sheets in bundles of convenient size to a Kron scale for weighing and then to a 600-ton Baldwin-Southwark pulp baling press for compacting them.

Following the pressing of the pulp bundles, they are discharged from the press upon a roller type conveyor, where they are wire tied through the use of a Griplock wire fastener and then conveyed to storage or directly to a common carrier for either rail or water shipment. Numerous wood-constructed skids and a Baker Hy-Lift truck are provided to expedite this movement of the completed bundles.

Water Supply and Distribution

Two deep wells, each 900 ft. deep and each individually equipped with a 4,000 g.p.m. Layne pump, supplies all of the water requirements of the mill.

The method of handling this water, after it is brought to the surface, is rather unique. It first is collected into a storage tank and then pumped from this tank into four elevated tanks for distribution about the mill.

The first tank to receive the water has a diameter of 25 ft. and a height of 15 ft. It is of lap-welded plate steel construction with an umbrella roof. The shell and bottom are of ¼ in. plate; the roof, of 3/16 in.

One of the four elevated tanks, a tank which serves a dual function, is an ellipsoidal bottom tank of 150,000 gallon capacity. It not only supplies water for sprinkler purposes but also maintains a constant head on the mill supply line. This dual function is accomplished through the use of a 3 ft. diameter riser that extends through the tank bottom and services the top 50,000 gallons of water within it. These 50,000 gallons float on the mill supply line; while the bottom 100,000 gallons are used for sprinkler purposes.

The distance to the bottom of this tank is 120 ft.

The capacity of each of the other three tanks is 50,000 gallons; the diameter, 26 ft.; and the bottom, ellipsoidal.

A service connection attaches directly to the bottom of each of these tanks. Indicators with float switches regulate the pumping.

The distance to the bottom of one tank is 50 ft.; of another, 40 ft.; and of the third, 25 ft. Such an arrangement keeps the water at the elevation to which it is to be used, rather than permitting it to flow to ground level and then repumping it.

All five of these water supply tanks were fabricated and erected by the Chicago Bridge & Iron Company.

Mill Service Pumps

Numerous pumps other than those mentioned are installed throughout the mill. The majority of them are of Warren Steam Pump Co. design, but in the remaining installations are one or more units of such well-known pumps as Dayton-Dowd, Dorrco, Goulds, La Bour, Wilfley and Worthington.

The causticizing and lime sludge recovery operations make use of the Dorrco, Goulds and Wilfley units; the Swenson evaporator installation, of the Dayton-Dowd and La Bour pumps; and the steam generating equipment of the Worthington units.

The Warren pumps are used for the pumping of fresh water, white water, hot wash water, condensate return, liquor, and stock.

Both the fresh water and white water pumps are of the double suction, hydraulically balanced, enclosed impeller type. Each of them is equipped with a horizontally split casing, ring-oiled sleeved bearings, a double acting thrust bearing of the ball type, and with wearing rings for case and impeller. Likewise, a cast iron base plate is used for each pump. The white water pumps, however, have special vent openings to prevent surging; the fresh water pumps have not.

Stock pumps and liquor pumps are of the single suction, open impeller type with renewable suction and head liners and each is provided with a hand hole opening and cover in addition to washout opening. Other similar characteristics include pedestal bearings of the ball type, arranged for oil lubrication and fitted with device to adjust rotating member to compensate for wear; impellers of the non-clogging type having a various number of blades, depending on the service; and unit cast iron baseplates of the box type with flexible couplings of internal gear design. The stuffing boxes of the liquor pumps, in addition, are arranged for water cooling with special provision made for water seal piping.

The booster pumps are of special vertical design with the motor of each unit mounted above the pump on a rigid cast iron supporting base and connected to pump through a rigid coupling. Propellers are of the open type; and submerged pump bearings are arranged for fresh water lubrication.

Pumps for handling excess machine white water and for serving the broke beater are designed for shallow pit application. Each of them is provided with a top suction and vertical up discharge which terminates above pump bowl. Likewise, each pump casing is fitted with renewable suction liners; and each rotating member is adjustable for wear through a ball type thrust bearing located in motor supporting base.

Odds and Ends

In the machine room, adjacent to the dry end of the machine, is a Valley Iron Works broke beater. This beater is equipped with an iron tub, a 52 in. diameter by 42 in. face roll, a continuous extractor,

and a Texrope drive with G. E. motor.

There is a very well equipped laboratory, and, as part of the equipment, there is a Ross air conditioning unit.

Among the many other control instruments are a number of liquid level recorders, temperature recorders, and pressure gauges of Foxboro design. There also is a Foxboro recording temperature controller on the hot wash water storage tank, and a Foxboro Stabilog temperature controller on the Rosenblad system. The Rosenblad system also makes use of two Foxboro dial type thermometers.

The 10,000 bbl. fuel oil tank, located over the water of Turtle River, has a diameter of 42 ft. 6 in. and a height of 39 ft. 11 in. It is supported on a concrete mat placed on creosoted piles. Surrounding the tank is an 87 ft. 6 in. diameter by 13 ft. 10 in. high fire wall of 3/16 in. plate.

Roster of Officials and Operating Executives

The official family of this mill, which has been erected at a cost of approximately $3,500,000, include George H. Mead, Chairman; Charles R. Van de Carr, Jr., President; Edward S. Wagner, Vice President and Treasurer; Sydney Ferguson, Vice President; J. L. Ober, Vice President and Manager; William R. Scott, 3d, Secretary; and William M. Carney, Assistant Secretary-Treasurer.

Among the operating executive personnel, in addition to Mr. Ober are Paul Hodges, Superintendent; R. E. Walker, Plant Engineer; Albert Alsos, Power Engineer; J. B. Thomas, Master Mechanic; S. R. Williamson, Chief Chemist; K. G. Meschke, Wood Supervisor, and R. H. Moureau, Office Manager.

TRIMBEY KNOTTERS at
BRUNSWICK PULP & PAPER CO.
Brunswick, Georgia

Give large capacity of clean stock and thoroughly washed rejects.

Pulp Screens
Consistency Regulators
Metering Systems
Weight Regulators
Float Valves

TRIMBEY MACHINE WORKS
Glens Falls, N. Y.

Fernandina

(Continued from Page 169)

by Merritt-Chapman & Scott Corporation, E. J. Biederman of this organization being in charge of construction activities at the site.

Construction activities were followed closely by J. J. Brossard, Vice-President in Charge of Production for all mills of the Container Corporation of America. Walter P. Paepcke, President of the company, also was affiliated closely with the entire development.

Unique Formal Opening

The mill was formally opened on January 14, 1938, with a program that was most unique. The day had previously been set aside as Florida Industries Day by Fred P. Cone, Governor of the State, and the entire celebration focused on the opening of the mill. In the program presented, a program which was broadcast over a nation-wide radio hook-up, Mr. Paepcke dedicated the mill to Dr. Charles Holmes Herty, Georgia scientist, who has done much to stimulate interest in a wider use of southern pines for pulp and paper. Such a public celebration accompanied by the unveiling of a bronze plaque of Dr. Herty, is believed to be without precedent in the history of the pulp and paper making industry of this country.

As necessary IN PAPER MAKING AS THE MACHINES THEMSELVES!

EFFICIENT lubrication systems are important factors in keeping machines running—in assuring low cost, uninterrupted production schedules!

For years, Bowser Oiling Systems have been the accepted standard in the paper industry—day after day proving their efficiency in reducing costs, minimizing shut-downs and reducing wear. All of which is definitely established by the fact that most paper mills use them—and that practically all of the world's paper production records have been made on Bowser lubricated machines.

To ably assist you, Bowser maintains a corps of experienced lubrication engineers—engineers who will be glad to consult with you in designing an oiling system to meet your individual needs—a system that will assure the utmost in economy and efficiency.

For time-tried, dependable Paper Mill Oiling Systems—consult Bowser!

S. F. BOWSER & COMPANY, INC
FORT WAYNE, INDIANA

For the Paper Industry
Bowser Manufactures

Oiling Systems

- For Dryer Sections
- For Chain Drives on Dryers
- For Calenders
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Storage and Dispensing Equipment

And Many Other Items

Recent Installations

Brunswick Pulp & Paper Co.
Brunswick, Ga.

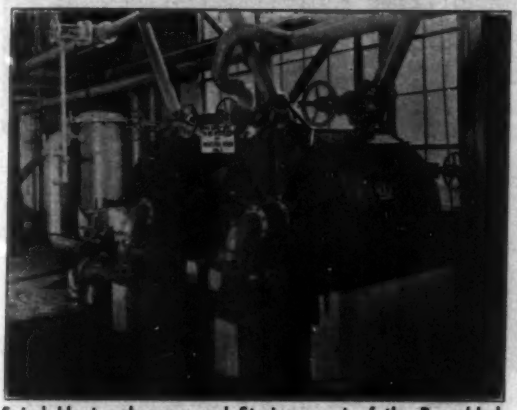
Container Corp. of America
Fernandina, Fla.

BOWSER ESTABLISHED 1885

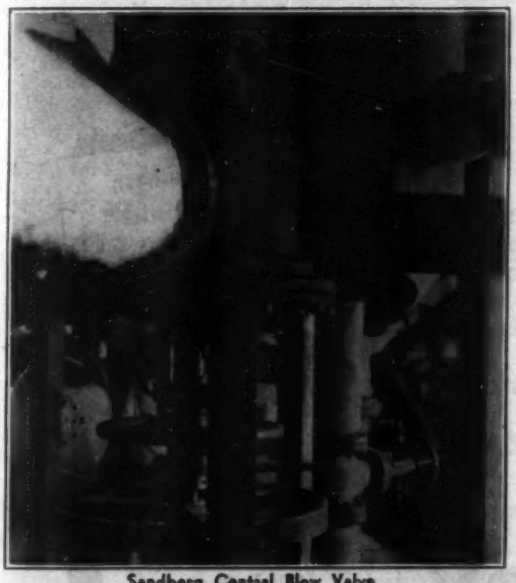
PAPER MILL OILING SYSTEMS

F. M. P. EQUIPMENT AT BRUNSWICK

F. M. P. Circ. & Ind. Heating System.



Spiral Heat-exchangers and Strainer, part of the Rosenblad Blow Steam Plant.



Sandberg Central Blow Valve.

4—F. M. P. CIRCULATING AND INDIRECT HEATING SYSTEMS FOR THE DIGESTERS. Cut shows pipe from circular strainer in middle of digester, circulating pump delivering liquor to bottom of heat-exchanger and outlet pipe from top of heat-exchanger to bottom of digester. Trap for condensate from heat-exchanger can be seen to the right.

1—ROSENBLAD BLOW STEAM CONDENSER PLANT. In the cut can be seen the two spiral heat-exchangers. The fresh cold water enters the spirals at top and after being heated is discharged through the center in front. The contaminated hot condensate from the top of the accumulator passes through strainer to the left into the spirals in the center at the rear and is discharged at top back to the bottom of the accumulator. The jet condenser for condensing the steam and the accumulator for storing the condensate also belong to the system.

1—SANDBERG CENTRAL BLOW VALVE connecting the four digesters with the main blow line to the blow tank.

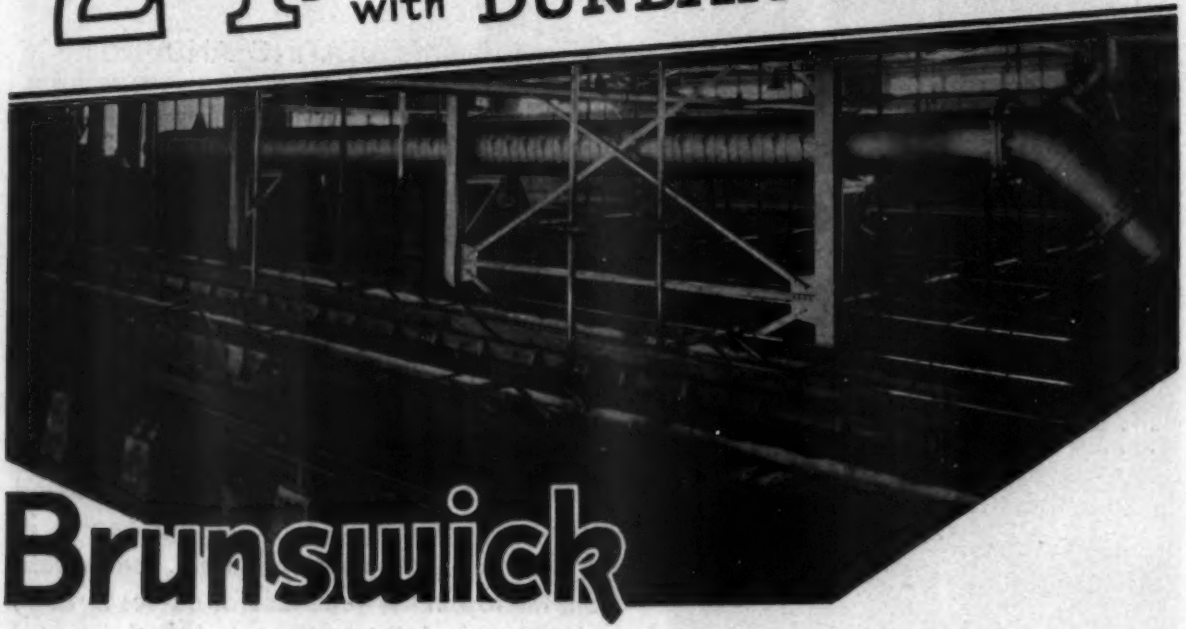
4—DRAMMEN BLOW VALVES (can be seen behind the circulating pump motor).

1—SPIRAL TURPENTINE CONDENSER for condensing the relief gases and cooling the condensate so that turpentine separates from the water.

FIBRE MAKING PROCESSES, Inc.

CHICAGO, ILLINOIS

24 IMPCO FLAT SCREENS with DUNBAR DRIVES



Brunswick Pulp & Paper Co. BRUNSWICK, GEORGIA

A notable installation for a notable new development. This imposing array of "Impco" Screens in one of the South's newest and finest mills embodies all the equipment features responsible for their enviable performance records throughout the industry.

Other New Southern Mills Equipped with "Impco" Machines.

Champion Paper & Fibre Co.
Chesapeake-Camp Corp.
Crossett Paper Mills
Fernandina P. & P. Co.
Kieckhefer Container Corp.
Kraft Corp. of America
National Container Corp.
St. Joe Paper Co.
Union Bag & Paper Corp.
West Virginia P. & P. Co.

IMPROVED PAPER MACHINERY CORPORATION

Nashua, New Hampshire

You'll Find This Name Plate on Handling Equipment in Most New Mills

JEFFREY

THE MARK OF RELIABILITY

The three new mills featured in this issue are equipped with Jeffrey material handling units. So are nearly all the other new Southern mills erected during the last several years. In them you find Jeffrey equipment handling logs, chips, refuse bark and dust; pulplap, salt cake and lime . . . also reduction equipment for sizing. This industry-wide acceptance leads to the question, why? . . . and to the answer, *reliability* and *long experience.*

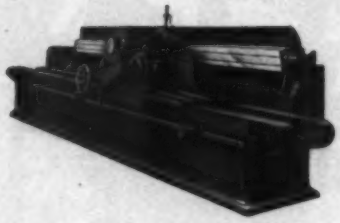
It appears appropriate to remind you here that Jeffrey has been serving the handling equipment needs of pulp and paper mills through half a century. This constant contact with your problem assures sound engineering, attention to provisions for future plant expansion, and rugged equipment, thoroughly developed and tested. You save time, money and worry by having a Jeffrey engineer help you work out your problems.

Yard conveyors (portable or fixed, also stackers and barge unloaders) . . . haul-ups . . . apron conveyors . . . belt conveyors . . . spirals . . . elevators . . . electric vibrating feeders . . . constant weight feeders . . . re-chippers . . . bark shredders . . . screenings grinders . . . salt cake crushers.

These three large Jeffrey-equipped mills are located in Florida, North Carolina and Georgia.

The Jeffrey Manufacturing Company
944-99 North Fourth Street, Columbus, Ohio

UNUSUAL PAPER KNIFE GRINDING SERVICE



• The unusual in knife grinding service (extreme accuracy with speed) is fast becoming commonplace through the nearly universal adoption of the important advances made by the Covel-Hanchett Co. In this issue of The Paper Industry the operations of three new mills are described. It is just a matter of course that you will find all three of these companies equipped with the Covel-Hanchett Mammoth Traveling Wheel Grinder, in accordance with the latest developments in that field.

Accuracy—To the highest degree.

Speed—More than doubled.

Grinding Wheel Expense—Cut one-third to one-half.

Floor Space—One-half that required for traveling carriage machines.

Carriage Ways—Completely covered with new patented way-cover system, with automatic force-feed lubrication.

Grinding Wheel Spindle—But we can't tell it all here.

•

• Send for Catalogue describing all the new features. You will be surprised at the advances made —by the Pioneers in the Industry—

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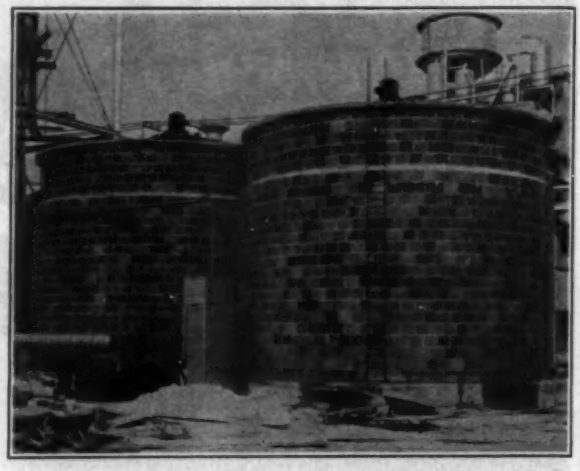
COVEL-HANCHETT CO.
Big Rapids, Michigan, U. S. A.

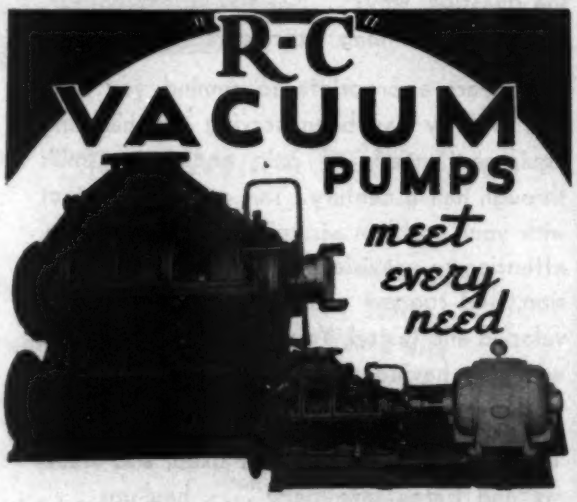
Kalamazoo for TANKS



One of two sets of Vitrified Glazed Tile stock chests installed at Brunswick Pulp & Paper Mill, Brunswick, Ga. They are 24 feet in diameter inside and stand 30 feet high.

Kalamazoo Vitrified Glazed Tile Tanks for stock chests, machine chests, etc., are clean, strong, permanent, and give you freedom from maintenance cost. Write for complete information.

KALAMAZOO TANK & SILO CO.
KALAMAZOO, MICHIGAN



No paper mill vacuum requirement too large or too small for Roots-Connersville new type, roller bearing, Herringbone Gear Vacuum Pumps.

Roots
CONNERSVILLE
BLOWER CORP.
The PIONEER YESTERDAY
The LEADER TODAY
CONNERSVILLE, INDIANA

PULP BLEACHING CO.

ORANGE, NEW JERSEY

AT BRUNSWICK—

Complete equipment for a 4-stage bleaching plant producing full white southern pine sulphate.

2 more of the nine Southern mills equipped By ROSS !

GEORGIA

FLORIDA

BRUNSWICK PULP & PAPER
Brunswick, Ga.

Upper circle shows view of the Ross Machine Hood. The Exhaust and Ventilating equipment as well as Air Conditioning apparatus was also furnished by Ross for this new mill.

KRAFT CORPORATION
Fernandina, Fla.

Six different types of equipment furnished by Ross, for this new mill:—Hood, Ventilating, Heating, Vapor Absorption, Exhaust and Air Conditioning.

J. O. ROSS ENGINEERING CORPORATION

Main Office 150 MADISON AVE., NEW YORK, N. Y.

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IN CANADA—ROSS ENGINEERING OF CANADA, LTD.—DOMINION SQUARE BUILDING, MONTREAL

FRESH WATER
WHITE WATER
LIQUORS—STOCK

WARREN PUMPS THEM ALL AT BRUNSWICK MILLS

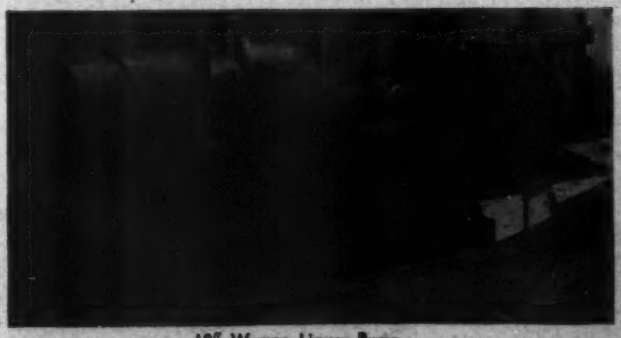
Warren Pumps were chosen because the Brunswick Engineers had confidence in their ability to meet every demand that might be made upon them. These men know that Warren considers each installation an individual engineering problem—that Warren Pumps are built to meet specific requirements accurately.

The ability of Warren stock pumps, for example, to handle high density stock steadily and efficiently is based on the close attention Warren engineers give to details. Special vanes on the impellers prevent clogging and binding—liberal clearances reduce wear, save maintenance—extra large inlets insure heavy stock reaching the impeller.

Your Warren representative will be glad to study your pumping requirements and prepare recommendations in the interest of improving efficiency and lowering costs in your mill.

6" Warren Centrifugal Liquor Pump.

6" Warren Centrifugal Pump supplying stock to washers.



10" Warren Liquor Pump.

WARREN

WARREN STEAM PUMP CO. INC., WARREN, MASS.

NORTH CAROLINA PULP COMPANY

PLYMOUTH, NORTH CAROLINA

Excavation Commenced March 10, 1937

First pulp produced October 8, 1937

JAMES STEWART & COMPANY

CONTRACTORS

230 PARK AVENUE NEW YORK

North Carolina Pulp Company

Plymouth, North Carolina

THE Kieckhefer Container Company, important manufacturer of paperboard and of fibre and corrugated containers, with paperboard mills at Delair, N. J., Three Rivers, Mich., White Pigeon, Mich. and Rockford, Ill., has entered the ranks of pulp producers through the erection of a 350-ton sulphate pulp mill.

Aspects of Mill Location

Careful study of the Atlantic coastal region, with their paperboard manufacturing operations and related problems always before them, resulted in the selection of Plymouth, N. C. as the home for the mill. Arrangements then were consummated for a site bordering on the south bank of the Roanoke River only a mile and a half west from the center of town.

The selection of this location places the mill in a region of colorful surroundings. It was as long ago as July 4, 1584, that an exploring expedition, sent out by Sir Walter Raleigh, set foot on North Carolina soil. The very next year witnessed the founding of a settlement on Roanoke Island, a settlement destined to vanish within a few years without leaving any traceable clew as to its fate. Then, too, it was along the Roanoke River, the very stream along which the mill is located, and a couple of its neighboring rivers in eastern North Carolina that the Tuscarora Indians were living when first encountered in this country. Woven into the very fabric of the region about Plymouth are tales of the war with the Tuscaroras as settlements along the Roanoke were among those which were attacked by the Indians in a rampage which started the conflict.

Dual Function of Roanoke River

The river, which is a tidal stream for about 80 miles from its mouth, empties into Albemarle Sound only eight miles from the mill. It not only furnishes water for all process, steam generation and general purpose uses about the mill, but serves as a means of water transportation as well.

Mill supply water for all purposes enters the pumping station from the river through a Link-Belt traveling screen and is distributed throughout the mill through the use of 5 Worthington centrifugals which are installed within the station. Two of these pumps, each with a capacity of 1500 g.p.m., are for fire protection service. The other three, each of 4500 g.p.m. capacity, are mill service units.

A typical analysis of the water, expressed in parts per million, shows it to have an alkalinity of 29, a hardness (soap) of 28, chloride content of 14, silica content of 20, and a turbidity of 50. The pH of the water in the same analysis was 7.3.

In addition to its location on a water route, the mill is also served by both the Atlantic Coast Line and Norfolk Southern Railroads. It likewise is on a system of improved roads. Such a location puts the mill in position to take advantage of whatever means of transportation is most advantageous for the problem at hand.

The site itself was farm land previous to its occupation by the mill. Its original land surface was such that comparatively little work was required to get it in shape to permit construction.

Materials Used in Building Construction

All mill buildings, with the exception of wood room and pulp storage building, are primarily of brick and steel construction. Carey corrugated siding is used on both the wood room and pulp storage building as well as on sidewalls of some of the other buildings where expansion is contemplated.

Mill Design and Construction Responsibilities

With the exception of foundations and buildings, the mill was designed by the engineering and production staff of the Kieckhefer Container Company under the direction of L. J. Meunier, Vice President and General Superintendent. All building construction was the work of James Stewart & Company of New York, N. Y., who as general contractor assigned the preparation of all plant drawings to the W. S. Lee Engineering Corporation of Charlotte, N. C.

Major Grouping of Mill Buildings

The layout of the mill includes two major groupings of buildings. In one group is the digester and diffuser building, the wet machine building, and the pulp storage building. In the other group is the turbine building, the recovery and evaporator building, the salt cake storage building, and a locker room building.

Both of the major groups of buildings, with the exception of the pulp storage building, are arranged in a broken straight line, the group including the locker building, the salt cake building, the recovery and evaporator building, and the turbine building being set back somewhat from the other group and yet in a straight line with it. The pulp storage building joins the wet machine building on the front at a right angle and extends outward to the river, thus permitting pulp to be taken directly from a shipping platform on the same side of the wet machine building to storage or directly to a barge for shipment, or from storage to the barge. Pulp also could be taken from storage and shipped by railroad, if desired.

Other Mill Buildings

Other buildings, each of which

is a separate structure, include the causticizing building, wood room, pump house, and the office.

Both the causticizing building and the wood room are to the rear of the plant, the causticizing building being directly behind the recovery and evaporator building, the wood room being somewhat behind the digester and diffuser building, but much further to the rear. The pump house is located on the river bank in front of the digester and diffuser room building; while the office is located somewhat to the front, between the mill and the river, and ahead of the entire mill as it is approached from the direction of Plymouth.

Outside Storage Tanks and Digester Blow-Down Condenser

In the yard, between the wood room and the causticizing building, is a 50,000 gallon Chicago Bridge & Iron elevated water storage tank and directly behind the recovery and evaporator building, but much further to the rear than the causticizing building, is the barking drum installation. This installation is immediately in line with the wood room and parallel to the major group of buildings.

Also located within the yard, in addition to various chemical liquor storage tanks and a Foster-Wheeler digester blow-down condenser, is a 300,000 gallon fuel oil storage tank. This tank is located to the rear of the wet machine building, slightly beyond the wood room and about 150 ft. from it.

Among the liquor storage tanks are two for weak liquor, four for white liquor, three for black liquor and one for green liquor.

In addition to these liquor storage tanks, there also is one hot and cold water tank. This tank functions in connection with the Foster-Wheeler digester blow-down condenser.

The digester blow-down condenser, the hot and cold water tank, and three liquor storage tanks, (one white, one black, and the other weak) are located in line along one side of the digester building, the side that faces the turbine building, the first of the next group of buildings.

The two other black liquor storage tanks are located in a continuation of the same line but in the area just beyond the rear of the digester building. In the space between these tanks and the adjacent wall of the causticizing building are two of the remaining three white liquor storage tanks; while the fourth white liquor tank, the second weak liquor tank, and the green liquor tank are located in the space between the recovery and evaporator building and the end of the causticizing building next to it.

Pulpwood Delivery

Pulpwood may be delivered to the yard of the mill by truck, water or rail. If delivered by water, it is unloaded from barges by means of a stationary type of grab crane; while a locomotive type of grab crane is used to unload wood which arrives by rail. Several railroad spurs permit convenient spotting of the loaded cars for unloading.

Wood Yard Conveyors

A system of seven Jeffrey conveyors delivers the wood from barges, cars, or storage to the barking drum installation. Four of these units, each 500 ft. long, are arranged parallel to one another and discharge directly into a line of two units. This two-unit combination has a total length of 786 ft.; begins at the river, and delivers its wood to a 160 ft. unit, which conveys it to two D. J. Murray barking drums, arranged in parallel. Two U-shaped metal chutes, joined together in the shape of a V and with the apex at the discharge end of the conveyor distribute the wood into the barking drums.

Features of Barking Drums

The barking drums are of the Murray-Branch patented type. They are two-section units; have 30 channels to a section; and have 3 channels in each section with the trough pointing inward. The drums operate on roller trunnions and are equipped with adjustable height discharge gates. These gates are made of heavy ship type channels. Concrete foundations under the drums are 8 ft. high to the base of the trunnions.

Both drums have an individual capacity of approximately 20 cords per hour and are operated dry.

Another Jeffrey conveyor, a unit 240 ft. long, delivers the barked wood from these two units to the wood room for chipping; while still another Jeffrey system of conveyors delivers the dry bark removed from the wood during the barking operation and the sawdust produced in the chipping operation to a rectangular-shaped surge bin.

Unusual Chipper Positioning

Processing equipment in the wood room includes two D. J. Murray chippers, four Orville Simpson Rotex chip screeners, and a D. J. Murray chip crusher.

Wood is fed to each chipper from the discharge end of the feeding conveyor by gravity. It falls from the discharge end of the conveyor over a parting bridge that divides part of the flow to each of the two units. This bridge is located about 20 ft. above the chipper spouts and is connected with them through two curved metal chutes, one for each spout, that are rather rectangular in shape and open at the top for some distance down from the inlet ends but are made to conform to the round shape of the chipper spouts for several feet before they connect with them and for this distance are closed for their entire circumference.

The two chippers, each direct-connected to an individual G. E. synchronous motor, are installed side by side on a heavy concrete mezzanine, three floors above ground floor level of the wood room.

Grading of Chips

Chips from each chipper drop by gravity upon a rather shallow and totally enclosed rectangular shaped metal chute which is divided at its lower end to connect with two of the four Rotex chip screeners on the floor below. Each chute is equipped with several inspection doors in its top surface to expedite unplugging, should plugging occur.

Each of the four chip screens are arranged in parallel. The top

screen surface of each unit is 5 ft. wide and 10 ft. 8 in. long; the bottom screen surface, 5 ft. wide and 10 ft. long. There also is an individual motor and V-belt drive that is built integral with each unit.

The chip crusher is located on the same floor as the chip screens and to one end of the four units. It is driven by an individual motor through a V-belt drive.

Some Conveyor Details

The system of conveyors for conveying the bark from the barking drums, for delivering this bark together with undersized chips to the surge tank, for chips and sawdust handling in the wood room, and for conveying the accepted chips from the wood room is a network of 14 Jeffrey units. In this network are two drag conveyors, eleven belt conveyors, and one apron conveyor, each unit being designed to meet its particular handling problem.

The chip belt conveyor, one of the eleven belt conveyors in this system, is 556 ft. long; is equipped with a Goodyear conveyor belt; and has a capacity of 11,000 cu. ft. per hour.

This conveyor is housed in its travel between the wood room and the digester building on a conveyor bridge. Structural steel is used for the framework of the bridge; while the floor is of wood planking, and the siding and roof of Carey corrugated material.

Chip Bin with Round Discharge Openings

The bin into which the chips are discharged from the conveyor, a hand-operated tripper being used to eject them, is open at the top except for an iron grid flooring. This flooring extends the full length of one side of the chip loft, across the conveyor head shaft end, and back about one-half way on the opposite side. A guard rail extends the full length of the grid flooring as a safety precaution.

The bin is of riveted steel plate construction; is U-shaped; and has six round discharge openings at the bottom, one above each of five A. O. Smith Corporation digesters and one at one end of the bin under which space has been provided for one of two additional digesters included in the design of the digester building. Capacity of the bin is sufficient to store 15 digester charges of chips, three charges for each digester.

The Digester Installation

Each of the five digesters has an over-all height of 39 ft. 7 in., an inside diameter of 11 ft. 3 in., and is equipped with a Foster-Wheeler indirect heater and a Dean Bros. centrifugal pump for liquor heating and circulation. The heater, supplied with 150 lb. steam, is designed to raise the temperature of a digester charge from 120 deg. Fahr. to 345 deg. Fahr. in one hour; while the Dean Bros. centrifugal has a capacity of 1460 g.p.m.

Auxiliary equipment, located on the operating floor of the digester building, includes a Brown temperature-pressure recorder and an Ashcroft-American pressure gauge on each digester, as well as an electric push button for each liquor circulating pump.

An elevator operates between the ground floor level and the chip loft of the digester building. This elevator supplies the only direct connection between the loft and the operating floor.

Handling Digester Blows

A cyclone receives the blows from the digesters and separates the blow steam from the stock, the blow steam going directly to the Foster-Wheeler blow-down condenser and the stock to any one of 16 Ingalls Iron Works diffusers.

The blow-down condenser is equipped with General Regulator thermostatic control equipment. It is designed to handle 3200 lb. of blow steam per minute and to heat water from 80 deg. Fahr. to 150 deg. Fahr. Water heated in this manner passes to storage in the adjoining hot and cold water storage tank and is drawn from this storage for pulp washing.

Rectangular Arrangement of Diffusers

The 16 diffusers are arranged over two rectangular-shaped concrete diffuser chests, two rows of four diffusers each over each chest.

Each of the diffusers is 27 ft. high; has a diameter of 15 ft.; and is equipped with a false bottom and a dump valve. The false bottom consists of a Monel metal top perforated plate, a wire cloth center, and a perforated metal bottom plate; and is supported on structural steel I-beams.

Space for eight additional diffusers is provided in the diffuser room layout.

A straight wash down of stock in each diffuser is the operating practice of the mill. After a diffuser charge has been washed sufficiently in this manner, it is dumped directly through a pipe connection into its respective diffuser chest.

Characteristics of Diffuser Chests

Each of the two diffuser chests is equipped with an incomplete partition. This partition connects with one end of the chest but not with the other. The two channels formed by the end which is closed off by the partition are connected from the outside with an Apmew agitator, through which circulation of stock is developed.

At the same end of the chest as the Apmew agitator is a record gate valve and piping connection that joins with a Worthington stock pump. This pump, directly connected to motor, elevates the stock into a distributing box, there being a distributing box for each diffuser chest.

Filtering and Concentration of Black Liquor

Dilute black liquor from the washing operation, previous to concentration, is passed through a Vallez filter to remove any pulp or any other non-soluble matter that might be present in it. This filter, made by Goslin-Birmingham Manufacturing Co., Inc., is of the closed, rotating leaf, pressure type. Operating in cycles, the liquor is recirculated through it during the start of a filter cycle for a time sufficient to build up a mat on the filter surface. Thereafter, over a filter cycle of approximately 6 hours, there is a continuous building up of this fiber cake. At the end of the cycle, the cake is discharged without opening the filter, and the cycle repeated.

Concentration of this filtered black liquor is accomplished in a Goslin-Birmingham quintuple effect, long tube, rapid circulation, film type evaporator, which is equipped with two concentrators, one of them a spare, and with a Schutte-Koerting barometric jet condenser. There also is a new centrifugal type catch-all for each effect for preventing entrainment and vapor manifolding. The piping arrangement is such that any one body can be cut out of service while the other units continue in operation. Liquor feed is split between the fourth and fifth effects and thereafter in backward feed.

La Bour pumps are used to pump the black liquor in process of concentration from one effect to the next in line of flow; while two Morris Machine Works pumps, one a spare, deliver the heavy black liquor from the first body of the evaporator, the evaporator being designed to concentrate black liquor from 17 per cent solids to 55 per cent solids, to the concentrators.

The concentrators are of the forced circulation, vertical tube type with outside heating elements for accessibility. Each of the units is served by a Dayton-Dowd special re-circulation pump.

Liquor as discharged from the concentrators, each unit being designed to concentrate the liquor from the evaporators at 55 per cent solids to 70 per cent solids, is pumped to a recovery boiler by means of two Worthington gear driven pumps. There also is a Worthington reciprocating steam pump as a stand-by for this same service.

Another of the features of the evaporator installation is that condensate from the second body on is flashed to successive bodies and is automatically handled through a central receiver and a La Bour condensate pump.

Boiler Equipped for Black Liquor and Fuel Oil Burning

The recovery boiler, designed by Badenhausen and furnished by Day & Zimmerman Co., Philadelphia, is equipped for both liquor and fuel oil burning. In the burning of liquor, salt cake is mixed with the liquor in the furnace nozzles and the mixture sprayed into the furnace where it is partially burned in suspension. The boiler operates at 650 lb. pressure and 700 deg. Fahr.

Bark and Sawdust Burned Dry and in Suspension

Another boiler, a unit for burning the bark and sawdust from the wood preparing operations, is installed as a companion boiler to the recovery boiler, the two units supplying all of the steam requirements of the mill for both process and electrical power generation. This boiler, also a Badenhausen furnished by Day & Zimmerman Co., Philadelphia, likewise is designed for an operating pressure of 650 lb. and 700 deg. Fahr. total temperature. Then, too, it is designed to burn fuel oil in addition to the bark and sawdust, either separately or both together, the bark and sawdust being burned in suspension in a manner similar to that of pulverized fuel.

Legends—Page 199

1—Wood room power distribution center—typical gas-proof control room.

2—Three of five centrifugal pumping units in pump house.

3—One group of mill buildings—from left to right—locker room, salt cake storage, recovery and evaporator and turbine.

4—Attractive mill office building.

5—View of general laboratory.

6—Pulp storage room showing 10-ton overhead crane.

Conveyor System for Delivering Bark and Sawdust to Boiler

The bark and sawdust is delivered to the boiler from the surge bin. Enroute from the bin, a system of Jeffrey conveyors, first, a gang of horizontal screw conveyors in the bottom of the bin, and then two belt conveyors, deliver the material to a specially designed vertical rotary dryer which is heated by stack gases from the bark burning furnace. After drying, the bark is shredded by means of a Jeffrey shredder and then conveyed over another system of Jeffrey conveyors, into the boiler house, first to a bin, and then directly into the furnace. This system includes a spiral conveyor from shredder to bucket elevator, a bucket elevator to bin, and a spiral feeder arrangement to chute from which it is blown into furnace.

All flow meters and temperature recorders used in connection with the boiler plant are of Brown Instrument design.

Boiler Plant Instruments

Condensate from the digesters, evaporators, and concentrators, used for boiler feed, is first passed through conductivity recorders and indicators. If contamination is present, the water automatically dumps to the sewer.

All recording instruments covering boiler output and steam used throughout the plant are installed on a panel board which is set up on the operating floor of the turbine room.

Electrical Generating Equipment

The turbine installation includes one Allis-Chalmers 4000 kw., 3 phase, 60 cycle, 2300 volt, 3600 r.p.m. high pressure non-condensing steam turbine generating unit with direct connected exciter; one 3000 kw., 3 phase, 60 cycle, 2300 volt, 3600 r.p.m. G. E. turbo-generator; and one Allis-Chalmers surface condenser.

The Allis-Chalmers steam turbine generating unit takes steam at 650 lb. and exhaust against 150 lb. back pressure. This back pressure steam is delivered to the G. E. turbo-generator which bleeds at 35 lb. and condenses the balance.

The Allis-Chalmers surface condenser, which serves the G. E. turbo-generator, is a 2450 sq. ft. single pass, welded steel unit. Its auxiliary equipment includes a condensate removal pump of the two-stage type and a steam jet air pump of the twin two-stage type.

Power from the generators comes onto full metal clad G. E. switchgear. This switchgear, positioned directly opposite to the panel board of recording instruments covering boiler output and steam used throughout the plant, and with the two generator units set up in parallel between them, supplies electrical energy to seven power distribution centers through six main feeders.

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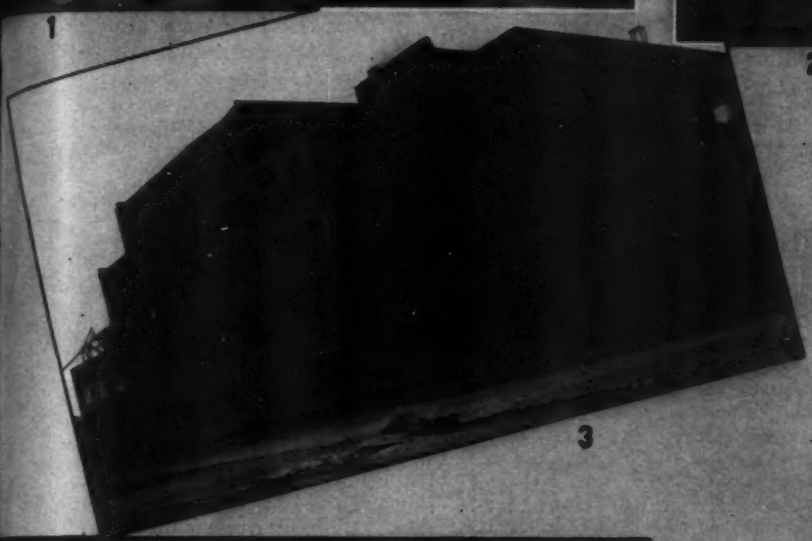

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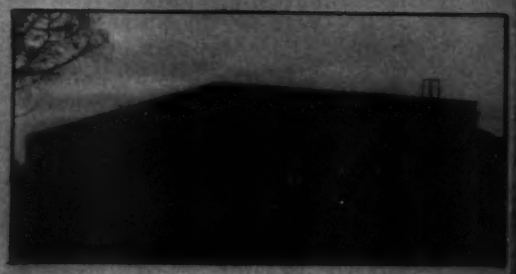

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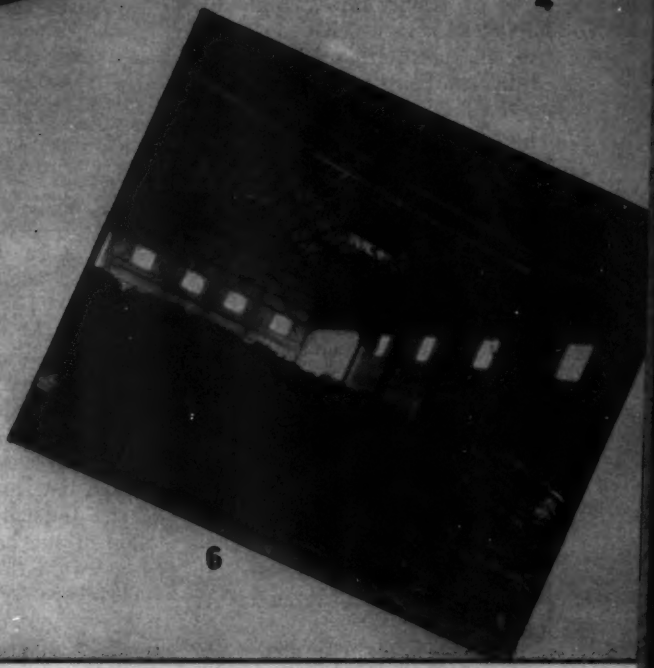


6

A 10-ton Whiting crane spans the full width of the turbine room, 60 ft. 8½ in., and operates over its full length. The turbine room also has space for the installation of a third generating unit.

Among the major items of equipment in the turbine room basement, ground floor level, in addition to the Allis-Chalmers condenser, are three steam headers (a 650 lb. header, a 150 lb. header and a 35 lb. header), a control battery for operating voltage of metal clad board, two field cubicles (one for each generator), and the generator and exciter field rheostats.

Mill Motors and Their Control

There are about 450 motors in the mill. Practically all of them are of the straight induction type and of General Electric design. They range in size from 300 hp. down to 1/3 hp. All of them of 40 hp. and over operate on 2300 volts; those under 40 hp., on 440 volts.

About 95 per cent of the motors are operated through remote control. There is one special application of it in the wood room. Here an operator, positioned on a crow's nest or operating platform, with full view of the wood yard and all wood handling equipment including chipper motors, chip screens and chip crusher, has full control of all of the equipment. Signal lights on an operating panel permit him to know when the individual item of equip-

ment is running. Likewise, he can be signaled through emergency stop buttons from the outside by operation of lamps on panel as to when to start equipment. As a safety measure, there also is an emergency stop button control for each motor which allows it to be locked out so that the operator in the crow's nest cannot place it in operation.

About 95 per cent of all motors are splash proof; about 50 per cent have special alkali resisting insulation.

Most controls are within gasproof control rooms. Another interesting feature of the electrical layout is the complete underground installation of all feeder and control wiring that traverses the mill yard.

Preparation of Green Liquor

Smelt from the recovery boiler drops by gravity into a single dissolving tank to which wash liquor from the causticizing plant is added in sufficient volume to make up the requirements of the green liquor volume for causticizing. This dissolving tank is rectangular in shape; is of welded plate steel construction; and is equipped with an incomplete partition that extends to one end but not to the other. An Apmew agitator connects the two channels formed by the partition at the end closed off by it and serves as the means of agitating the green liquor.

Causticizing and Lime Sludge Recovery

This green liquor is delivered to an International Filter causticizing system within the causticizing building where it is treated with lime.

The lime sludge from the settlers of the system is pumped by means of Marlow sludge pumps, nine in the installation, to two Impco lime sludge filters, where it is concentrated and then discharged to two Nichols-Herreschoff vertical lime reburning furnaces which are located directly beneath them.

Both the lime sludge filters and the re-burning lime furnaces are located within the causticizing building along with the International Filter equipment for causticizing.

The Nichols-Herreschoff furnaces are each of ten hearth design. Each unit has an outside diameter of 16 ft. 8⅞ in.; is equipped with an American blower to supply central shaft with cooling air; and is heated with fuel oil. Four Viking oil pumps supply the fuel oil to the furnaces. There also is a blower on the oil burning system of the units.

Handling of Re-burned Lime

Re-burned lime, discharged from the bottom of the furnaces, is conveyed over a system of Jeffrey conveyors to a divided lime storage bin, one side for re-burned lime, the other side for new lime. This system includes two helicoid spiral feeders and a continuous bucket elevator. Its capacity is rated at 2½ tons per hour.

The lime bin sets directly above the slaker classifier which delivers slaked lime to the causticizing system. Capacity of the fresh lime side of the bin approximates 120 tons; while the re-burned lime side has a capacity of about 60 tons.

Legends—Page 201

7—Blow down condenser plant and six storage tanks—(a) hot and cold water, (b) weak liquor, (c) black liquor, (d) white liquor, (e and f) black liquor.

8—One of two lime mud filters above calcining furnaces.

9—Digester room showing line of four digesters and circular openings in chip bin bottom.

10—Arrangement of chip screens showing chip reject conveyor in immediate foreground.

11—Chipper installation—three floors above ground floor level. Note stairway to crow's nest.

Pulp Screening and Thickening

The two distributing boxes, which receive the washed pulp from the diffuser chests, connect with a horizontal pipe header, which distributes it to a line of four Impco knotters. Located below the line of knotters at an elevation to permit gravity flow to them from a common header is a line of six Impco screens.

The screen accepted stock, the line of screens also discharging to a common pipe header, flows by gravity to a line of six A. D. Wood's machines. These machines concentrate the stock from about .6 per cent to from 1.5 per cent to 2 per cent.

Surges in flow from the knotters to the screens, and from the screens to the A. D. Wood's machines is absorbed through the use of vertical pipe risers, one for each knotter and one for each screen. There also is a Reading, Pratt & Cady gate valve in each branch line connecting the individual machine with its respective header.

Horizontally Arranged Plate Steel Stock Chests

Gravity flow delivers the concentrated stock from the A. D. Wood's machines to two U-shaped, horizontally arranged, plate steel stock chests. There is one chest for four consecutive machines in line. The other chest, the smaller of the two, receives the stock of the remaining two machines.

Two Apmew agitators, one for each end, serve the larger chest; while agitation in the second chest is maintained through the operation of a single Apmew unit.

Final Concentration of Stock and Preparation of Pulp Sheets

Two discharges from the bottom of the larger chest and one from the bottom of the smaller chest connect with three Kamyr presses, there being one feed line for each press. A Record gate valve in each line permits control of stock flow to the respective press.

The three presses, arranged side by side, have an individual total length of 37 ft. 6 in.; and operate individually at a discharge speed of approximately 50 ft. a minute. There is a motor and V-belt and gear drive arrangement for each unit. In addition, a Nash Hytor vacuum pump serves each of the suction moulds.

Handling of Pulp Sheets

Piles of pulp sheets, each with a moisture content of about 50 per cent, are transported by means of a towmotor gasoline-operated truck from the Kamyr presses to the shipping platform, where it is picked up by a 10-ton P & H crane, which spans the entire width of the pulp storage building and travels its entire length. This

crane deposits the pulp piles within the storage building for future shipment or delivers them immediately into the hold of a 2500-ton barge for delivery by water to the mill at Delair, N. J. Shipment of pulp also might be by rail, a railroad spur extending along the shipping platform to facilitate car loadings.

Facilities of Laboratory

The mill laboratory facilities, occupying about 900 sq. ft., include a general laboratory, a pulp testing laboratory and a stock room. Among the major items of equipment in the general laboratory is a Parr's calorimeter, two Becker chainomatic balances, a Freas electric drying oven, a Hopkins electric muffle furnace, an extra large hot plate, a Stokes water still, and a Precision

Scientific laboratory centrifuge. The pulp testing laboratory is equipped with a Valley Iron Works 1½-lb. beater, a Hermann's sheet forming machine, a power driven Mullen tester, and an Elmendorf tear tester. Then, too, there is an extensive stock of inorganic chemicals and reagents for mill control work, a Pyrofax installation for laboratory burners, and the beginnings of a good library. The laboratory also makes use of Sheldon laboratory furniture.

Other Mill Highlights

The machine shop is located in the space provided for the installation of the additional diffusers. It is equipped, in part, with a Landis bolt threading machine, an Oxweld acetylene generator, a Hisey-Wolf grinder, a Lodge & Shipley 16/20 lathe, a Champion arbor press, a Wells metal band saw and two electric welding machines.

There are 106 pumps in the mill. More than half of the total number are Worthington units. In the remaining number are pumps by Allis - Chalmers, Dayton - Dowd, Dean Bros., Dean Hill, Kinney Mfg., La Bour, Marlow, Nash, Pomona, Quimby, and Viking.

A Covel-Hanchett knife grinder is installed on the ground floor level of the wood room. This grinder, a Size 100 with a 200 in. length of carriage travel, is for use in grinding the knives of the chippers.

Locker room and wash room facilities are not only provided in the locker room building but at several other convenient locations as well.

Reading Pratt & Cady valves are used throughout the power plant and also on all steam lines in the mill.

The piping arrangement in the turbine room permits operation of either turbine to supply both electrical energy and process steam for the plant—both 150 lb. and 35 lb.

An International Filter hot flow softener with filters and coagulating tank is used for boiler water treatment.

There also is a Worthington deaerating feed water heater which operates under 35 lb. back pressure. Water from this heater is fed to the boilers through a system of double feed mains, one system a standby. Pumps for this service include two Worthington units—one electric driven, the other turbine driven, and either of which has sufficient capacity to meet the water requirements of the entire boiler plant.

Other boiler plant equipment includes Copes double thermostatic type boiler level controls, which are actuated by both steam flow and water level.

Gates V-belts are used on practically all belt drives throughout the mill. Typical applications of these drives include stock chest agitator drives, vacuum pump drives, dissolving tank drive, concentrator pump drives, pulp screen drives, Kamyr press primary drives, and diffuser chest agitator drives.

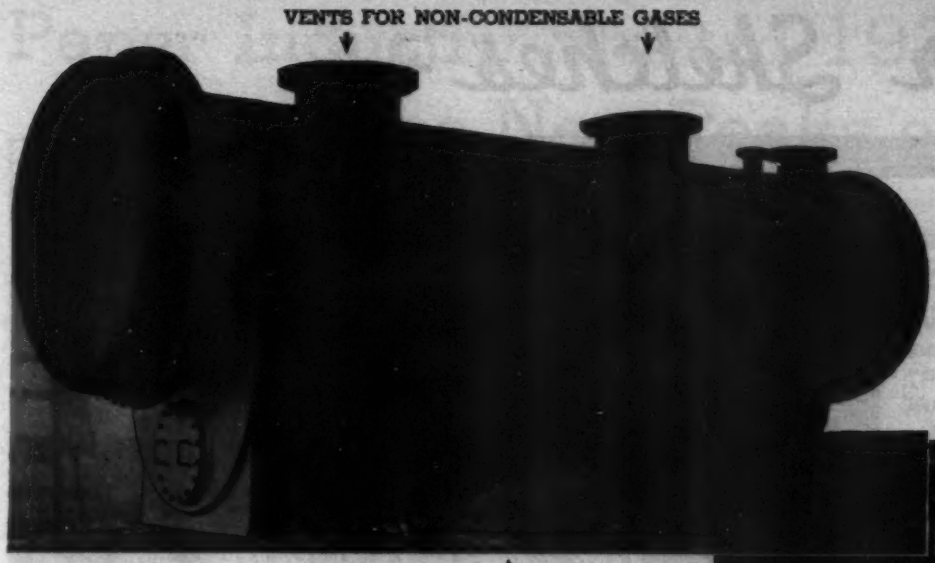
There is a Brady pneumatic system for handling salt cake from car to storage, and one for unloading new lime.

Benjamin Turnlox lighting equipment with Standard RLM reflectors are used throughout the mill.

A first aid room is provided for the treatment of minor injuries. Included in its list of equipment is an instrument cabinet, an instrument table, an examining table, a white metal bed with head rest, an infra red lamp and a number of such other items as constitute a well-equipped room for the purpose it serves.

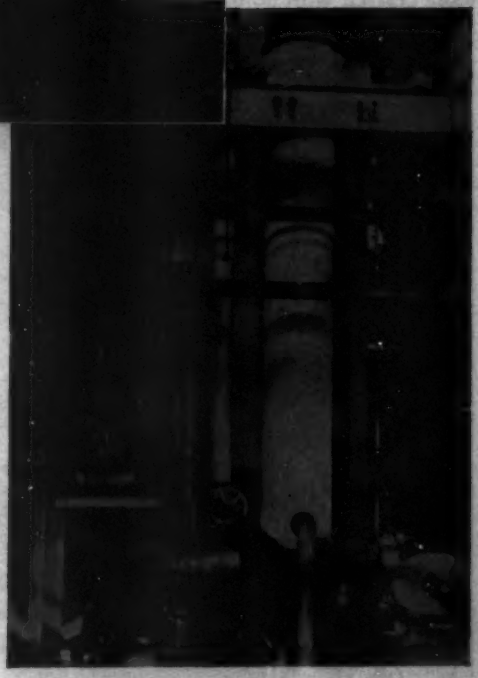
Executive Personnel

A roster of officials and operating executives of this new mill would include the following: J. W. Kieckhefer, President; L. J. Meunier, Vice President; H. M. Kieckhefer, Secretary; O. H. Cox, Mill Manager; L. J. Meunier, Jr., Superintendent; L. C. Odenath, Mechanical Engineer; D. W. Beall, Electrical Engineer; M. J. Polk, Power Engineer, and E. A. Harper, Chief Chemist.



Digester blowdown condenser for Kieckhefer Container Corporation, Plymouth, N. C.

Below: One of the five indirect digester heaters, with circulating pump.



HEAT CONSERVATION AT KIECKHEFER MILL

• The indirect heating of digesters at the Plymouth, North Carolina, mill of the Kieckhefer Container Corporation and the use of a condenser to recover the heat flashed off when a digester is blown down, provides effective cooking of pulp at minimum cost.

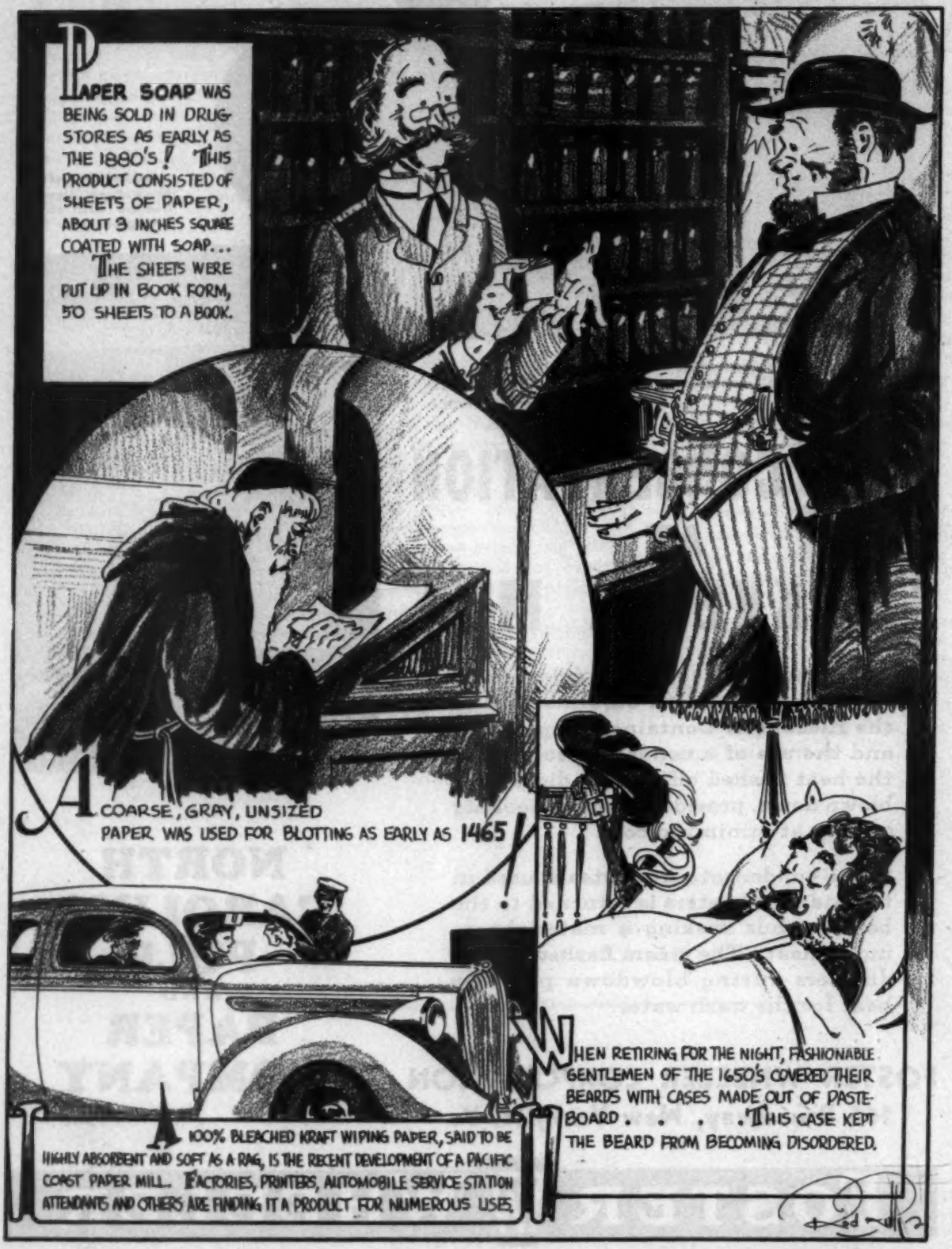
• The condensate from steam used in the indirect heaters is returned to the boilers, thus making a material saving in heat. The steam flashed off the diffusers during blowdown provides heat for the wash water.

NORTH CAROLINA PULP AND PAPER COMPANY

FOSTER WHEELER CORPORATION
165 Broadway, New York, N. Y.

FOSTER WHEELER

Paper Sketches ---


PAPER SOAP WAS BEING SOLD IN DRUG STORES AS EARLY AS THE 1880's! THIS PRODUCT CONSISTED OF SHEETS OF PAPER, ABOUT 3 INCHES SQUARE COATED WITH SOAP... THE SHEETS WERE PUT UP IN BOOK FORM, 50 SHEETS TO A BOOK.
A COARSE, GRAY, UNSIZED PAPER WAS USED FOR BLOTTING AS EARLY AS 1465!
WHEN RETIRING FOR THE NIGHT, FASHIONABLE GENTLEMEN OF THE 1650's COVERED THEIR BEARDS WITH CASES MADE OUT OF PASTE-BOARD . . . . THIS CASE KEPT THE BEARD FROM BECOMING DISORDERED.
A 100% BLEACHED KRAFT WIPING PAPER, SAID TO BE HIGHLY ABSORBENT AND SOFT AS A RAG, IS THE RECENT DEVELOPMENT OF A PACIFIC COAST PAPER MILL. FACTORIES, PRINTERS, AUTOMOBILE SERVICE STATION ATTENDANTS AND OTHERS ARE FINDING IT A PRODUCT FOR NUMEROUS USES.

Paper Industry Started 1938 Below the New Peaks of 1937

UNCHALLENGED for six years, the peak for paper production in the United States, which was established in 1929 at 11,140,235 tons, first surrendered its pre-eminence in 1936. The latter year overshadowed it by 7.5 per cent, as production rose to 11,975,552 tons. It was left farther behind in 1937, when production advanced to 12,600,000 tons, outweighing the 1936 tonnage by 5.2 per cent, and that of 1929 by 13.1 per cent. This was an outstanding achievement, in view of the 40 per cent slump in mill production ratios during the second half of 1937.

Higher by 1.4 per cent than the peak of 607,590 tons, which had weathered the years since 1929, writing paper production set up a new one by going to 616,000 tons for 1937, according to the statistics of the Writing and Cover Paper Manufacturers' Association. Book, wrapping, and tissue papers, and paper board also reached all-time production highs in 1937. Newsprint production for the United States and Canada finally entered new high ground, as 1937 total of 4,591,030 tons, computed by the News Print Service Bureau, was 11.4 per cent over the 4,121,103 for 1929.

Less affected than some of the other major industries by the 1937 year-end slump, mill operations were lifted 17 per cent from December to January. While the incline lengthened through February and March, 1938, first-quarter operating ratio was down 25 per cent from 1937. Tonnage production fell 10 to 25 per cent; wholesale volume shrank 15 to 30 per cent. Price structure generally was firm, despite isolated weakness. These were some of the major developments revealed by a survey of the paper industry, which has just been completed by DUN & BRADSTREET, INC.

Production Upturn Slow

After reaching 92.1 per cent of capacity in April, 1937, operations at paper mills tumbled to 54.5 per cent by December. This was a drop of 40.8 per cent in eight months, during the last four of which the monthly difference was extended progressively from the corresponding 1936 rate. Despite this steep slide, the industry's operating ratio for 1937 averaged 85 per cent of capacity, the highest on record, excepting 1920 at 86 per cent.

January operating ratio, based upon paper production reports to the American Paper and Pulp Association, rose 17.2 per cent from December to 63.9 per cent of capacity. The rise was lengthened to 68.7 for February, and to 69.2 for March. Compared respectively with 90.3, 90.1, and 90.3 for January, February, and March, 1937, the drop was 29.2, 23.7, and 23.4 per cent. Up from 108.2 in January to 108.8 in February, Department of Labor's employment index for the paper and pulp industry was down 6.3 per cent from February, 1937.

While paper production for the first quarter went 10 to 25 per cent under the comparable 1937 tonnage, the loss was not uniform in all divisions. Orders were more numerous for cover than for book, ledger, and other fine paper items. Kraft held the steadiest level in the coarse paper group. Newsprint dropped 22.5 per cent from the 1937 first-quarter output; January marked the first year-to-year loss in thirty-one months. February at 263,958 tons was down 24.1 per cent from 1937 to a three-year monthly low.

Order Downtrend Halted

Curtailment of orders to wholesalers, which started as early as August, 1937, was gripped almost to cessation by December. At the opening of the current year, markets were dull. Uneven improvement appeared late in January, and spread to a faster pace through February and March. Despite this upturn, orders received during the first quarter of 1938 were 15 to 30 per cent smaller than the comparative 1937 volume, with the average estimated around 15 per cent. Decline in office forms and stationery was about 10 per cent.

Situation thus was reversed from that of the 1937 first quarter, when wholesale volume jumped 15 to 40 per cent over its 1936 comparative. By the end of the third quarter, however, the spread had been narrowed to 10 to 20 per cent. With successive year-to-year losses deepened during the final three months, all that was left at the close of 1937 was an increase of 8 to 12 per cent over the 1936 wholesale volume. This sudden check in the order flow caught some wholesalers with inventories 25 per cent larger than on December 31, 1936.

Preliminary report of the "Survey of Business Trends" gave the inventories of 47 wholesalers of paper and paper products, at the close of 1937, as 12 per cent more than at the 1936 year-end. By April 1, some of the wholesalers had worked down their inventories 5 to 10 per cent, in spite of the cautious buying policy of retailers. Majority of orders released was for urgent use, but covered only immediate needs, with quantity specified small.

Price Reductions Minor

No major price mark-downs occurred as a corollary of the restricted sales since last Fall. Price-cutting developed to some extent, but was confined chiefly to converted paper products in comparatively small quantities. Both krafts and book papers have held steady. The small reductions on some grades of sulphate bond papers were not general.

On most grades of coarse paper, Fall quotations were maintained, due to higher wages and increased costs of materials and distribution. Contract newsprint was advanced on January 1, as scheduled, from $42.50, which obtained during 1937, to $50 a short ton for the first half of 1938. No announcement was made regarding the second half-year price.

Index of wholesale paper and pulp prices of Bureau of Labor Statistics hit the 1937 high at 95.0 in June. Irregular downtrend left but 89.8 for December, or 5.9 per cent ahead of January at 84.8. Edging to 90 for January, 1938, it slipped in February to 89.7, which was 2.5 per cent over 1937, and above previous February indexes to 1928 at 92.6.

Failures Touched Nadir

Exactly three times the 1936 number, 6 applications for 77-B benefits were filed by paper manufacturers in 1937. This total was half the 12 for 1935, the all-time high, and equalled the 6 for 1934. For the first time since Section 77-B became effective, the 1937 list included 1 wholesaler. The 2 cases for January-February, 1938, were manufacturers.

Fifth consecutive annual reduction carried total failures in the paper industry down to 11 for 1937. Less by 5, or 31.2 per cent, than the 16 for 1936, the fewest up to that year, the 1937 number established a new low. Monthly failure average for 1937 thus was less than 1; with 6 defaults, this was lifted to 2 for the first quarter of 1938.

Insolvency record of the paper industry from 1927 to March, 1938, shows:

Paper Manufacturers

Year	Number	Liabilities
1927	9	$2,188,500
1928	7	877,600
1929	10	1,929,200
1930	4	1,371,000
1931	11	2,794,208
1932	9	2,577,451
1933	11	2,262,734
1934	9	894,000
1935	2	166,000
1936	5	529,000
1937	1	12,000
1938*	1	1,500

(*) January to March, inclusive.

These statistics of failures in the paper industry are exclusive of applications under Section 77-B. From June 7, 1934, when Section 77-B of the New Bankruptcy Act became effective, to February 28, 1938, applications were filed by 28 manufacturers and by 1 wholesaler.

The information on this page is quoted from a survey of the paper industry recently published by DUN & BRADSTREET, INC.—*Editor's Note.*

◆ U. of Maine Offers Summer Course in Paper Technology

The University of Maine will again conduct a summer course in pulp and paper technology during the six weeks between July 5 to August 12, 1938, it was announced recently. Professors Paul D. Bray and John G. Caulfield will direct the work which includes lecture courses in pulp and paper manufacture, paper laboratory, pulp and paper coloring and bleaching and paper testing and analysis. In addition to class instruction and laboratory work there will be a number of mill visits.

These courses are designed for paper salesmen, laboratory helpers and all employees in the industry who previously have not had an opportunity to obtain a general scientific understanding of the pulp and paper industry.

A copy of the summer session catalogue, which explains courses offered, expenses, etc., may be obtained by addressing Director R. M. Peterson, University of Maine, Orono, Maine.

◆ Michigan Paper Co. Wins Safety Contest

The Michigan Paper Company of Plainwell, Mich., won first place in the Michigan Paper Mill Safety Contest for the second time in two years, in competition with twelve other mills of the state. The contest was sponsored by the Michigan Mutual Liability Company of Detroit and records show that the Michigan Paper Company won the premier award on the basis of having but four lost time accidents during 1937. With 446,071 man hours of employment, this gives a frequency rating of 8.9. There were 57 days lost as a result of accidents in the mill which gives a severity rating of 0.12.

A dinner was held in celebration of the event in Plainwell on April 14 and was attended by all members of the safety committee and plant executives. Speakers at the gathering were: Dwight L. Stocker, president and general manager of the paper company; Ray Barton, general superintendent; M. S. Fogarty, superintendent of power, and Ed. H. Valliere, safety engineer of the Michigan Mutual Liability Company, who presented the mill with a bronze plaque.

◆ Charles Haas to Build New Strawboard Mill in Ohio

Charles Haas, general superintendent of the Consolidated Paper Company's north side mill in Monroe, Mich., has resigned and is undertaking the financing and construction of a new strawboard mill in Southern Ohio. Mr. Haas, a director of the firm, has been with Consolidated since 1919.

Mr. Haas said that he plans to construct a new building housing a paper machine with a capacity of from 80 to 100 tons of strawboard daily. The plant will employ between 60 and 70 persons and will cost approximately $600,000 including equipment. Mr. Haas believes that Southern Ohio is one of the most favorable locations for strawboard manufacture both in regard to supply of raw material and market for the sale of the finished product.

◆ Silco Process Placed in Commercial Operation

The Silco Pulp Products Company, Cleveland, Ohio, reports that its first commercial de-inking unit is being operated in the plant of the O. B. Andrews Company, Chattanooga, Tenn.

The Andrews Company has expressed entire satisfaction with the results obtained so far, and it is probable they may extend the use of the process to a number of grades of waste other than that which has been proved commercially feasible.

◆ Container Corp. Has Unique Display at Packaging Show

A miniature rainstorm apparatus, which with periodic peals of thunder and flashes of lightning, would pour torrents of water on containers stacked below, was one of the features of the Container Corporation of America's huge display at the Packaging Exposition held in Chicago recently. The Container Corporation was the recipient of one of the coveted awards offered by Irwin D. Wolf, Pittsburgh manufacturer. The show attracted 5,000 persons during its four-day period.

◆ New Mexican Mill

A new pulp and paper mill is to be built at Toluca, Mexico, according to the Productora e Inportadora de Papel. The plant will consist of a unit capable of producing 60 metric tons daily of mechanical pulp, utilizing the spruce which is available in that region. A sulphite plant is also to be erected.

◆ Seaboard Official Surveys Southern Pulp Industry

The demand for wood cellulose seems almost insatiable, due to the fact that science and chemistry are rapidly extending the use of pulp, according to Warren T. White, general industrial agent of the Seaboard Railway, who told members of the American Society of Engineers meeting in Jacksonville, Fla., April 20, that the near future will witness a wide diversification of pulp and paper developments throughout the South, including the manufacture of newsprint and other white papers.

"It is true," said Mr. White, "that the ultimate objective is lower production costs but the recent building of pulp and paper mills in this area is the result of underlying economic forces which have been in the making for many years. These developments have profound implications for the economic future of this entire section. Small wonder that these developments have excited not only national but world wide interest."

Mr. White said that in the two year period ending December, 1937, fourteen new mills were established in the South, entailing a total investment of approximately seventy million dollars. Thirteen of these are kraft mills and one is a sulphite pulp mill. Expansions of previously existing mills, improvements in equipment and investments in timberlands, will bring the total expenditures on pulp and paper developments in the South to upwards of $100,000,000 for the two-year period, according to the Seaboard expert.

"The principal reasons for the rapid expansion of the industry in the South," said Mr. White, "can be summarized briefly under three headings: (1) Increased market demands, (2) Outstanding advantages for low cost manufacture, and (3) Proximity to large consuming markets."

◆ Plans Under Way for New Italian Cellulose Plant

A new Italian company, recently established by one of the leading paper mills through an agreement with the Italian Institute for Industrial Reconstruction, will manufacture cellulose on a large scale from domestic raw materials. In Italy, the industry is faced with the necessity of substituting chemical pulp for rags in the manufacture of paper. Italy's requirements of this type pulp for the production of rayon, explosives and allied products amount to about 300,000 tons a year of which 50,000 tons are produced within the country.

◆ R. F. Linsert Now Associated with McCorkindale Company

Richard F. Linsert, formerly advertising manager of the American Writing Paper Company, Holyoke, Massachusetts, has joined the newly-formed McCorkindale Company, also of Holyoke, exclusive manufacturers of Suction Mold Papers. Mr. Linsert will be in charge of sales and advertising at the McCorkindale concern. William P. McCorkindale, president of the firm, was responsible for many improvements in paper making equipment prior to his recent invention of the Suction Mold Process.

◆ W. F. Ashe Now Heads Wis. Department of Commerce

William F. Ashe, personnel director of the Thilmany Pulp and Paper Co., Kaukauna, Wis., has accepted the position of director of the new Wisconsin Department of Commerce, at Madison, Wis. Thirteen candidates were approved for this position, but the selection of Mr. Ashe was unanimous.

Mr. Ashe has had much experience as a director having been recreational director for the city of Pittsburgh from 1910 until the World War, during which he was district director of training camp work at Newport, R. I., Petersburg, Va., and the West Indies, Canal Zone and Nicaragua. Mr. Ashe has been personnel director for Thilmany for the last nineteen years.

◆ Formulate Plans for Wisconsin Safety Meet

The general committee on arrangements for the eighth annual Wisconsin River Valley Safety Conference met at Wausau, Wis., April 21, to complete plans for the meeting which will be held at Antigo, Wis., June 9.

After details of the general session to be held in the morning had been discussed, the chairmen of the seven sections outlined their afternoon program.

The chairman of the Paper and Pulp Section, Oscar Duus, of the Tomahawk Kraft Paper Company, and co-chairmen, F. H. Rosebush, of Mekoosa-Edwards Paper Company, and Clayton Braatz, Marathon Paper Mills Co., outlined their program which includes a moving picture made at the Kimberly-Clark Corporation, a talk by J. A. Limpert, superintendent of the Kimberly mill and a general discussion led by Mr. Limpert.

◆ Plan Huge Technical Information Bureau

Initial plans have been completed for the establishment of a huge technical and commercial information Bureau where executives, engineers, designers, production managers, writers and others may procure without cost technical data and literature on materials, products and processes, as well as technical consultation service. The Bureau will be located in the International Building, New York City, and is being sponsored by Designers for Industry, Inc., through its Chicago, Cleveland and New York offices.

The Bureau will be manned by a corps of consultant specialists representing the eight major divisions of industry. An initial ten-thousand drawer filing system is contemplated from which trade literature will be distributed to persons interested.

◆ New Company Takes Over Kalamazoo Wax Paper Co.

The assets of the Kalamazoo Wax Paper Company have been taken over by the Kalamazoo Wax Paper Products Company which became incorporated on March 18, 1938. The former concern has been operated by a creditor's committee for the past year and has been engaged in the manufacture of bread wrappers since 1910. Carleton W. Reade, of the sales department of the Kalamazoo Vegetable Parchment Company, is president of the new firm.

◆ H. S. Strouse Made Vice-Pres. of Harnischfeger Corporation

H. S. Strouse, treasurer of the Harnischfeger Corporation of Milwaukee, Wis., has recently been appointed vice-president of the concern, it was announced recently. Mr. Strouse will continue to direct the activities of the Treasurer's Department which he has headed since 1931.

Mr. Strouse graduated from the school of electrical engineering at Purdue University and was subsequently employed by the Interstate Public Service Company at Newcastle, Ind. After the World War he entered the employ of the Western Electric Company and shortly after became affiliated with the Harnischfeger Corporation.

◆ THE MENASHA PRODUCTS COMPANY, a division of Marathon Paper Mills Company, Menasha, Wis., has announced the purchase of the physical assets and good will of F. M. Longnecker, of Delta, Ohio, manufacturer of the Kant Leek Paper Dish. The Menasha company will continue the production of Kant Leek dishes.

◆ B. H. Perkins Patents New Wrapping Device

Benjamin H. Perkins, president of the American Tissue Mills, Holyoke, Mass., has been granted a patent on an invention for a machine-wrapped package of napkins, displacing the old method of hand-wrapping commonly used for packaging pliable articles. By means of the new invention, it is said that the napkins can be fed readily into a packaging machine, forming a trim, compact package that holds the contents tight thus avoiding injury to the edges of the napkin.

◆ Johns-Manville to Build New Plant in Virginia

The Johns-Manville Corporation has announced the organization of a Virginia subsidiary which has acquired 142 acres of land near Jarratt, Va., on which it will erect a new factory for the manufacture of insulating board products, according to Lewis H. Brown, president of J-M.

Construction of the new plant will start immediately. It will require an expenditure of over a million dollars and when it gets into full operation, will employ between 300 and 400 persons. Large quantities of Southern pine from the locality will be used to provide the wood pulp from which J-M insulating products are to be made.

◆ A. MILLARD DANIELS has been made president of the L. L. Brown Paper Co., of Adams, Mass., succeeding his father, the late Arthur B. Daniels in the executive post. The new president who has served as treasurer since 1920 is also secretary and is succeeded as treasurer by his brother, Rupert B. Daniels.

◆ G. E. Buchanan

G. E. Buchanan, one of the founders of the Appleton Wire Works, Appleton, Wis., passed away at his home in that city on April 9 at the age of 68. He had been secretary-treasurer of the company.

Mr. Buchanan founded the Appleton concern along with his brother, father and uncle, in 1896 and watched it grow from a plant containing but four looms to a unit of sixty looms, occupying an entire city block. Mr. Buchanan's grandfather was a weaver in Scotland and the date of the industry's founding in the United States coincides with his arrival in 1847. Five of the leading paper mill wire cloth plants in this country and in Canada were founded by members of the family.

Mr. Buchanan was a director of Northern Paper Mills Company and was secretary and director of its subsidiary, the Tuttle Press Company, Appleton. He was also a prominent member of the Appleton Chamber of Commerce and a director of the Y.M.C.A. for many years. Survivors of Mr. Buchanan include his widow, two daughters and two sons. One son, William, is sales manager of the Appleton Wire Works, Inc.

◆ Edward C. Rauch

President of the Consolidated Paper Company and a pioneer in the manufacture of paperboard, Edward C. Rauch passed away suddenly on April 12 at the age of 78.

Hardly any phase of civic enterprise, municipal government or business and industrial development of Monroe, Michigan, where the Consolidated firm is located, can be mentioned without some reference to Mr. Rauch. He served twice as mayor of the city and operated retail and wholesale establishments in the county. He engaged in the manufacture of rope and cordage and he developed the paperboard industry into the city's largest single enterprise.

Mr. Rauch was in business for himself at the age of 20, operating a lime kiln, and when he had saved $300 he opened up a store at a junction of a railroad development where the village of Britton now stands. He came to Monroe in 1885 and entered the commission business with his brother-in-law, L. W. Newcomer as a partner. After other experience in the wholesale and retail business Mr. Rauch formed a partnership, in 1893, with C. August Boehme, organizing the Boehme and Rauch Cordage Company. In 1897 their product was known throughout the midwest and it was then decided to try their hand at paperboard manufacture. In 1902 they installed a new machine in a leased mill and in 1903 built a new mill with a daily capacity of 25 tons to produce everything in the line of cardboard.

In 1921, the Boehme and Rauch firm united with the Binder Board Company to form the Consolidated Paper Company. The Binder Board Company had been organized by Mr. Rauch's former partner, L. W. Newcomer and L. W. Leathers. The Consolidated Company now has its large plant at Monroe, a plant at Aurora, Ill., and one at River Rouge, Mich.

Mr. Rauch was married three times and of eleven brothers and sisters, five survive. He is survived by his widow, the former Cora Madera whom he married in 1920.

◆ Portable Brinell Meter

A portable Brinell meter, which simultaneously makes impressions in a reference bar and the material to be tested, has been announced by Louis C. Eitzen Co., 280 Broadway, New York, N. Y. The outfit consists of 1 Brinell meter instrument, 6 standard bars of carefully determined hardness, 12 standard steel balls of 10 mm. diameter, 1 scale for measuring diameters to 1/10 mm., 1 set

of direct-reading hardness tables showing Brinell units, 1 key for instrument to insert new ball, 1 set of instructions, and 1 leather-covered carrying case. In making a test, one of the standard reference bars is nested in the Brinell meter instrument where it is supported in contact with one of the 10 mm. diameter steel balls and the assembly placed in position on the surface of the material to be tested. Then a plunger within the instrument is given a sharp blow with a hammer and the Brinell hardness noted by reference to the direct reading hardness table after comparing impression diameters in the bar and in the surface of the material under test.

◆ Ventilating Fans

South Bend Air Products, Inc., 322 East Colfax Ave., South Bend, Ind., has announced an improved line of industrial fans under the designations of

Dynaflow and Aerospot. There are two, four and six blade Dynaflow units, in sizes from 16 in. diameter to 36 in. diameter inclusive, having air deliveries from 1240 c.f.m. to 26,000 c.f.m. The Aerospot fans range in size from 20 in. diameter to 36 in. diameter; are of the portable type; and are stated to be effective as man coolers at distances from 50 ft. to 175 ft.

All fan blades are manufactured from aluminum alloy drop forgings. Rolled steel is used for the intake rings and motor supports of all Dynaflow units. Especially designed motor supports are available for use on fans which are to move corrosive gases. Likewise, corrosive resisting finishes can be supplied for such equipment.

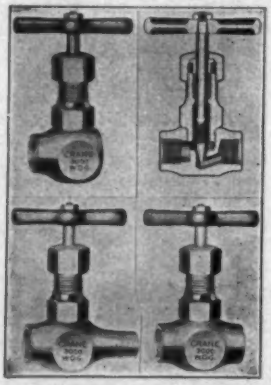
◆ Car Spotter Positions Diffuser Inlet Piping

The Longview Fibre Co., Longview, Wash., has made a novel installation of Link-Belt vertical-capstan electric car spotter. This spotter, located on the diffuser room operating floor, is em-

ployed to move the diffuser inlet piping from the top of one diffuser to another. A couple of wraps of the haulage rope around the capstan, a snatch block suitably located, the towing end of the rope secured to the discharge end of the inlet piping, and a few turns of the capstan swings the piping into any position.

◆ Valves with Bonnets and Bodies of Bar Stock

Three new valves are being introduced by Crane Company, Chicago, Ill.



These valves, designated as bar stock valves because their bodies and bonnets are made from solid bar stock, are furnished either in steel, Exelloy or 18—8 chrome nickel alloy and in plug type disc, globe and angle patterns. The manufacturer suggests that the Exelloy valve is particularly suitable for handling oil or gas containing sulphur compounds or for installation where steel valves do not have sufficient resistance to atmospheric corrosion. The statement is also made that the 18—8 alloy valve is especially suited for oil or gasoline containing hydrogen sulphide or sulphur dioxide when moisture is apt to be present.

◆ Pressure Oil Filters

Three larger sizes of pressure filters, added to a former list of five, have been announced by Wm. W. Nugent & Co., Inc., 410-412 North Hermitage Ave., Chicago, Ill. The new filters are known as Fig. 1116 H A—Sizes 8R, 8S, and 8L. The filtering surface of the 8R unit is 4609 sq. in.; that of the 8S unit, 9472 sq. in.; and that of the 8L unit, 15,496 sq. in. The three units have an overall

FIG. 1116 XK-8L

diameter of 18½ in. in each case; while their respective heights are 21 in., 31 in. and 43 in., and their respective flanged pipe thread inlets and outlets are 1½ in., 2 in. and 2½ in. Construction and operation of these units is the same as for Size 4L, an earlier unit, except that there are eight textile filter bag elements wound around a central spool in the new units as contrasted with four in the Size 4L.

◆ Softness, Porosity and Smoothness Tester

An instrument for testing the softness, porosity and smoothness of paper has been announced by W. & L. E. Gurley, Troy, N. Y. This instrument, designated as the new Gurley-Hill S-P-S Tester, measures a given air-leakage either over or through the paper. Air, at uniform low pressure, is supplied by an inverted cylindrical cup floating freely in an outside cylinder partly filled with oil. Graduations on the inner cylinder are timed as the cylinder displaces air and drops.

Tests are made by clamping sample between a fixed upper orifice plate and one of three interchangeable lower plates.

One of these plates, the softness plate, has four steel lugs, approximately .002 in. high, which are pressed into the paper by means of a lever arm and weight. This action decreases the aperture between the plate and the paper, the softer paper being penetrated deeper and giving a longer reading.

A second plate, the smoothness plate, has a plane annular ring which is polished optically flat. Smoothness is

measured by clamping several samples, having a hole punched through them, against this plate. Air escapes over the surface of the several samples. The smoother paper gives the higher reading.

The third plate, the porosity plate, is supplied with a standard orifice of 1 sq. in. In making a porosity test, the sample is clamped tightly, and air forced through it in the same manner as with the Gurley Improved Densometer.

The Gurley-Hill S-P-S Tester was developed by Dr. H. S. Hill, Director of Research, Price Brothers & Co., Ltd., in co-operation with W. & L. E. Gurley.

◆ Process Timing Device

Zenith Electric Company, 607 South Dearborn St., Chicago, Ill., has announced a synchronous program clock and process timer. The standard model of this device, which is offered in four types, has a large, legible 24-hour dial and a 1-hour dial cam. Two pointers connected with an electrical contact arm ride each dial.

Segments are cut in the 24-hour dial at the periods signal is to operate. The 1-hour dial cam has slots at each 15 minute period.

At each 15 minute period, one pointer drops into a slot on the 1-hour dial, but cannot make a contact until the pre-set time is reached on both dials. Then both pointers drop at the same moment, resulting in a contact with ringing of signal for a predetermined period.

In Type P-24, the time periods are set at the factory and signal operates 5 seconds, or as predetermined. Type P-524 is similar except time periods can be set or changed any time. Type P-24A is like P-24 except operating period is adjustable from 1 to 15 seconds; while Type P-524A is similar to P-524, but has adjustable operating period of 1 to 15 seconds.

The manufacturer claims tha this device, properly adapted to the purpose in view, is capable of solving practically any timing problem.

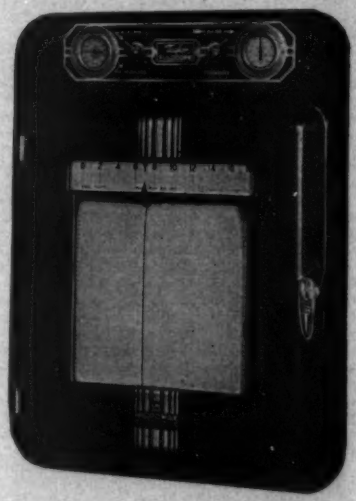
◆ Circular Knife Grinder

Samuel C. Rogers & Company, 191-205 Dutton Ave., Buffalo, N. Y., has announced a new knife grinder for top or bottom slitter knives and for any thickness, single or double bevel or flat face, solid or split, circular discs from 2 in. to 20 in. in diameter. This grinder, designated as the new CC3 knife grinder, is a completely self-contained unit with

control switches located on cabinet base. Regular equipment includes a 1/3 h.p., 3600 r.p.m. motor for driving grinding wheel, a 6x½x½ grinding wheel (also available with cup wheel), a wet grinding attachment, and a 1/3 h.p., 1700 r.p.m. motor for driving knife spindle and water pump. A triple slide provides adjustments to meet all requirements of circular grinding; while a graduated scale provides for accurate setting. Adjustable steel gibs take up wear. The wet grinding attachment, with splash guards, consists of a built-in two step coolant tank, equipped with centrifugal pump, piping and pet cocks for circulation of water. There also is a tool compartment in the cabinet base.

◆ Manual By-Pass for Automatic Control Equipment

Taylor Instrument Companies, Rochester, N. Y., have announced a manual by-pass arrangement as standard equipment on Taylor Fulscope Micromax controllers. With this by-pass, change-over from manual to automatic control, or vice versa, is simple. When on automatic control, the air supply is maintained at 25 lb. Before changing over from automatic to manual control, the output



air pressure to the diaphragm valve is observed and the air supply reduced to that value. Thus, when the Fulscope mechanism is by-passed, the control point is maintained. During manual operation, control point adjustments and compensation for changes in load are made by reducing the air supply pressure and observing control record. Without opening the instrument case or requiring any tools, the air pressure to diaphragm valve is instantly adjustable. The name plate is plainly marked to simplify proper adjustments.

◆ Glass Filter Cloth

A filter cloth, woven from staple length fibers of 100 per cent glass and designated as Fiberglass, has been announced by Filter Media Corporation, Irvington-on-Hudson, N. Y. This cloth is strong and pliant; withstands temperatures up to 500 deg. Fahr.; and is as resistant as chemical glass to attack from all hot or cold acids except hydrofluoric. It is easily cut to fit shapes of different filter elements and is readily sewed with 100 per cent glass thread. The cloth is manufactured in seven different weaves and weights, each in widths of 26, 32 and 38 inches. Other widths can be obtained to order.

New Catalogues and Publications

E. B. Badger & Sons Co., Boston, Mass.—A new 15-page bulletin (No. 100) describes and illustrates the various kinds of packless expansion joints manufactured by this company. By means of photographs and diagrams, together with the written material, the various improvements in the product are shown, and in addition, the bulletin explains how to select the right type of self-equalizing joint for a given problem. List prices, dimensions and weights are included in the release.

Bailey Meter Co., Cleveland, Ohio.—This company has just published a 32-page bulletin containing an analysis of 7,000 combustion tests made during the last twelve years on all types and sizes of boilers including a full range of fuels and methods of firing. In addition to describing and illustrating the company's meters, there is included an interesting section entitled, "Limiting Factors in Reducing Excess Air," which shows graphically the average percentage of excess air with which various classifications of boiler units are operating.

Bristol Co., Waterbury, Conn. A new loose-leaf bulletin (No. 507) concerned with this company's pyromaster recording potentiometer, has been issued lately by the concern. Presented in a clear and concise manner, this release explains the construction, application and features of the unit by means of written material and photographs.

Electric Controller & Mfg. Co., Cleveland, Ohio—An extremely interesting publication by this company, written in the manner of a case study, explains the use of the company's automatic power factor regulator. The 24-page publication, bound in a stiff brown cover, gives the method employed by the company in studying the conditions in its plant, selecting methods for improving power factor and describes how this was accomplished. The book also indicates simple methods which may be used if poor power factor is suspected in a plant. Copies of this release are available from the company.

Elgin Softener Corp., Elgin, Ill.—The purpose of this company's new edition of a treatise on boiler water entitled "The Inside Story of Boiler Water Conditioning," according to the manufacturer, is to explain in simple, non-technical terms, the conditions most frequently encountered and to discuss the various methods of softening, treating water and removing concentration from the boiler. Written in a manner similar to that used in compilation of a handbook, this release contains much valuable information regarding the title subject. It is well illustrated.

Forest Products Laboratory, University of Wisconsin, Madison, Wis.—This institution has recently published the address of C. E. Curran, principal chemist in charge of the pulp and paper section, entitled "Relation of Growth Characteristics of Southern Pine to its Use in Pulping," and given before the convention of the Association of Agricultural Workers, Atlanta, Ga., on Feb. 3, 1938. The mimeographed text takes up seven pages and there are several illustrations.

General Electric Co, Schenectady, N. Y.—The contributions of G-E engineers and scientists to the art of measurement are described and beautifully illustrated in a new 33-page brochure recently published by this company. The edition contains many full page photographs and diagrams which, together with the splendidly written material, tell the story of how instruments are designed, constructed and tested at the G-E company. This publication, bound in blue, is entitled, *When You Can Measure.*

Ingersoll-Rand Co., Phillipsburg, N. J.—A new bulletin (No. 9046) recently published by this company covers single, two and three-stage steam jet ejectors for removing air, gas or vapors from condensers and vacuum chambers in industrial processes. Using photographs and cross-section drawings to good advantage, the bulletin explains the application and characteristics of ejectors and illustrates the operation and arrangement of all types of ejectors with either surface or barometric precoolers, inter and aftercondensers.

Johns-Manville, New York, N. Y.—An interesting booklet describing the characteristics and history of the microscopic vegetable known as the diatom and telling how the tiny siliceous valves of these organisms are converted into an industrial item of economic significance, has recently been published by this company. The book tells of the uses of Celite—or diatomaceous earth—and describes its value as a filter-aid, insulation, flatting agent, delicate abrasive, etc. The book is written in a simple manner and is well illustrated.

Mason-Neilan Regulator Co., Boston, Mass.—This company has recently issued an attractive new bulletin (No. 3010) which describes the company's line of pressure recorders and recording and indicating themometers. The bulletin is profusely illustrated and contains many diagrams and specification tables relative to the design, construction and application of the units manufactured by the company. The release is bound in a shiny black and red cover and is forty-three pages in length.

T. Shriver & Co., Harrison, N. J.—This company's new catalogue (No. 38) on filter presses and diaphragm pumps is now available for circulation. This release, written in the style of an instruction manual, contains a wealth of data relative to the machinery manufactured by the company, in addition to much general information regarding such subjects as purpose of filtering operation, capacity required of the filter press, location of feed, comparison of filter plate types, etc. The book is well illustrated and contains many informative diagrams and drawings, in addition to the interesting written material.

BOOKS

Eye Hazards in Industrial Occupations—This handbook was published in 1924 and formerly sold at the actual cost price of $1.50. In order to secure wider distribution, however, the National Society for the Prevention of Blindness, Inc., New York City, is now offering copies at the special price of 50 cents each. The book, written by Louis Resnick and Lewis H. Carris, is a handbook for safety engineers, safety inspectors, safety committeemen, industrial physicians and nurses; for those responsible for industrial operations, whether owners, managers, or members of the operating staff; and for many others who share the responsibilities for conserving the life, health and sight of the millions of men and women employed in industry. The volume contains 247 pages and includes 59 illustrations dealing with the safeguarding of eyesight in factories, mines, shops and offices. Although some of the photographs show safety devices which have since been improved upon, the contents remain a valuable guide to safe practices in the industry. Orders or inquiries should be addressed to the National Society for the Prevention of Blindness, 50 West 50th Street, New York, N. Y.

Economic Possibilities for Rayon Production in the Columbia River Area—This 198-page mimeographed report covers the rayon yarn industry, its historical background and present status in the United States. The technology of the viscose, cellulose acetate and cuprammonium processes is described and the availability of the raw materials in the Northwest is pointed out with costs. Economic factors are discussed including plant sites, labor costs, labor supply, power, fuel, taxes, etc. Conclusions are given as to the economic possibilities presented for location of a rayon plant in the Northwest. The report was compiled by William C. McIndoe, industrial chemist, and is published by the War Department, office of the Division Engineer, North Pacific Division, 523 Pittock Block, Portland, Ore. Price is $1.25.

The Chemistry of Synthetic Surface Coatings—This book, written by Dr. Wm. Krumbhaar and published by Reinhold Publishing Corporation, 330 West 42nd Street, New York, N. Y., discusses chemical reactions in the varnish kettle, drier chemistry, surface chemistry of pigments and paints, physical chemistry of surface coatings, and synthetic resins in printing inks. Likewise, it includes a classification of synthetic resins and describes ways and means of using such resins in the formulation of varnishes, enamels, and lacquers. A number of descriptive photomicrographs also are reproduced. Of particular interest to the papermaker is the chapter on synthetic resins in printing inks; but helpful ideas should be forthcoming from the other pages as well. The price of the book is $4.00 a copy.

Industrial Chemistry (Third Edition)—Dr. Emil Raymond Riegel, Professor of Industrial Chemistry, University of Buffalo is the author of this book. With the support of a large number of collaborators, Dr. Riegel develops his subject as an elementary treatise for student and general reader and brings into this edition data on some of the new developments in the field of industrial chemistry as well as retains information on the basic features of numerous chemical industries. The book, conveniently divided into fifty chapters, contains a number of chapters that should be of more or less interest as reference material to chemists, technologists, production executives and others associated with the pulp and paper industry. Only the individual reader would know of material which would be of personal interest, but, suggestive of the book's contents, there are individual chapters on Caustic Soda and Chlorine; Fuels, Steam Boilers, Hydroelectric Power, Steam Power, and Production of Cold Water for Municipalities and for Industrial Purposes . . . Sewage Disposal Plants; Cellulose from Wood; Pulp and Paper; Cellulose from Wood and Cotton; Artificial Silk; The Manufacture of Dye intermediates; The Manufacture of Dyes; Pigments, Paints, Varnishes, Lacquers, Printing Ink; Synthetic Resins, Natural and Synthetic Phenol, Nitrocellulose and Aceto-cellulose Plastics, Casein Products; Leather, Gelatin, and Glue; and Rubber. This book is a work of approximately 850 pages and is priced at $5.75 by its publisher, Reinhold Publishing Corporation, 330 W. 42nd St., New York, N. Y.

Photoelements and Their Application—Written by Dr. Bruno Lange, Consulting Engineer, Berlin-Dahlem, and formerly Research Physicist with Kaiser Wilhelm Institute, and translated by Dr. Ancel St. John, this volume takes up the historical development of photoelements, various theories concerning the semi-conductor photoeffect, and the physical properties of semi-conductor photocells. It also discusses the construction and performance of the photoelements, photoelectric illumination meters, exposure meters for photographic purposes, special photometric apparatus, long distance transmission of quantities, amplifying equipment, photoelectric switching and signal devices, and use in various fields of activity. The book contains an extensive bibliography with numerous references to periodical literature as well as to certain books It is a work of nearly 300 pages that is priced at $5.50 a copy. Reinhold Publishing Corporation, 330 W. 42nd Street, New York, N. Y., is the publisher.

The Paper Industry Safety Contest

July 1, 1937 to June 30, 1938

Cumulative Scores as of March 31

12 Mills Have Perfect Record

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
A			
B			
C	Finch Pruyn & Co., Inc.	Glens Falls	New York
D	Bird & Son, Inc.	Phillipsdale	Rhode Island
D	United States Envelope Co.	Morgan Paper Co. Div.	Lititz, Pa.
D	Rogers Fibre Company, Inc.	Bar Mills	Maine
D	The Mead Corporation	Nashville	Tennessee
D	Hollingsworth & Whitney Co.	Aroostook & Cobbossee Mills	Gardner, Maine
D	International Paper Company	Mill No. 23	Riley, Maine

Division II—Paper and Board Re-Manufacturing

Bird & Son, Inc.	Norwood	Massachusetts
Bird & Son, Inc.	Chicago	Illinois
Texas Corrugated Box Co., Inc.	Dallas	Texas
Bemis Brothers Bag Co.	East Pepperell	Massachusetts
Bay West Paper Company	Green Bay	Wisconsin

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P-139	1	1	.801
	P- 44	2	1	.827
	P- 19	3	4	4.031
	P-108	4	9	4.357
	P-121	5	7	5.338
	P- 13	6	7	5.467
	P- 84	7	9	5.890
	P- 28	8	24	6.821
	P- 1	9	16	6.964
	P- 18	10	12	7.111
	P- 10	11	9	7.139
	P- 12	12	9	7.210
	P- 30	13	8	7.387
	P- 21	14	10	8.961
	P-136	15	11	9.018
	P- 97	16	10	9.920
	P- 60	17	15	10.411
	P- 9	18	26	12.170
	P- 23	19	12	12.396
	P- 62	20	20	12.482
	P- 11	21	12	12.731
	P- 73	22	29	14.167
	P-102	23	19	14.329
	P- 27	24	50	15.118
	P- 67	25	36	17.156
	P- 64	26	19	17.380
	P- 40	27	42	26.578
	P- 87	28	49	29.008
	P- 71	29	40	35.659
	P- 32	30	43	36.689
	P-140	31	51	40.612
GROUP B	P- 22	1	2	2.431
	P-135	2	2	2.832
	P- 72	3	3	4.940
	P- 4	4	3	5.192
	P-133	5	4	5.216
	P- 60	6	5	6.117
	P- 58	7	5	6.756
	P- 68	8	6	7.038
	P- 70	9	6	9.907
	P-143	10	9	10.210
	P-142	11	7	11.046
	P-122	12	9	11.993
	P- 59	13	8	12.017
	P- 2	14	11	13.330
	P-128	15	11	14.211
	P- 26	16	11	14.598
	P- 15	17	10	14.806
	P-112	18	11	15.264
	P-107	19	14	15.624
	P- 45	20	11	16.525
	P- 16	21	11	17.034
	P- 3	22	14	17.786
	P-123	23	13	19.063
	P-137	24	12	19.789
	P-120	25	17	21.213
	P- 25	26	18	21.632
	P-130	27	17	23.122
	P-124	28	17	24.902
	P- 82	29	21	29.365
	P-104	30	25	38.317
	P-111	31	17	41.913

March report missing—covers eight months only:
P-11, P-27, P-112, P-130, P-119, P-131, Bay West Paper Company.

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP C	P- 55	2	1	2.058
	P- 89	3	2	5.114
	P- 88	4	4	8.626
	P- 43	5	3	8.748
	P-119	6	5	11.520
	P- 61	7	5	12.258
	P- 37	8	5	12.864
	P- 94	9	5	16.971
	P-113	10	6	17.036
	P- 52	11	7	18.794
	P- 46	12	9	18.813
	P- 47	13	8	25.025
	P- 14	14	7	25.628
	P- 33	15	10	27.204
	P- 48	16	9	30.639
	P-103	17	9	30.709
	P- 41	18	18	35.341
	P- 29	19	13	35.909
	P- 34	20	15	41.794
	P- 80	21	16	49.250
	P- 17	22	15	50.354
GROUP D	P- 5	7	1	4.403
	P-117	8	1	5.401
	P- 86	9	1	7.582
	P- 35	10	1	8.132
	P-141	11	1	*9.456
	P-129	12	2	10.062
	P- 50	13	3	14.047
	P- 93	14	2	14.730
	P-110	15	1	15.189
	P-125	16	2	15.749
	P- 91	17	4	16.504
	P-106	18	4	19.718
	P-134	19	4	20.916
	P- 36	20	4	21.131
	P- 90	21	3	21.853
	P- 49	22	4	22.149
	P- 7	23	5	23.945
	P- 6	24	5	23.968
	P- 63	25	5	24.021
	P- 81	26	5	24.243
	P- 42	27	4	24.511
	P- 98	28	4	25.377
	P-138	29	5	25.612
	P-116	30	7	26.350
	P- 38	31	3	35.705
	P- 65	32	4	37.020
	P-131	33	5	63.826

Division II—Paper and Board Re-Manufacturing

R-23	6	2	2.814
R-20	7	5	6.706
R-19	8	2	7.587
R-13	9	2	8.077
R-21	10	4	8.775
R-28	11	5	11.905
R-10	12	5	12.643
R-11	13	2	20.401
R-27	14	6	20.432
R-24	15	8	21.250
R- 1	16	11	24.283
R- 9	17	5	26.764
R-26	18	12	38.578
R- 4	19	6	66.655

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◆ War Ruins Chinese Mills

A brief survey of the damage done to paper mills in China as a result of the present conflict has been released lately in *Side Runs of the Paper Trade*, a publication of the Department of Commerce.

Mills listed as destroyed include the Great China Paper Mill, Woosung, near Shanghai; Shanghai Paper Mill, Chapei, Shanghai; Ming Foong Paper Mill, Kashing, Chekiang Province and Wha Foong Paper Mill, Hangchow, Chekiang Province.

Listed tersely as "partly destroyed" is the Kiangnan Paper Mill, Chapei, Shanghai. The Pao Shan Paper Mill, Chapei, had its office building destroyed by gun fire and one boiler was damaged by a falling chimney. The machinery of this mill was said to be still intact. The Imperial Paper Mill at Lunghwa, Shanghai, moved its machinery to Hankow after the wet end of one machine was bombed and before the fall of Nantao to the Japanese. It is understood that there is no intention of having the machinery erected at Hankow.

The Japanese now control the Tien Chang Paper Mill, Yangtsepoo, Shanghai, and the Tien Chang mill at Pootung, Shanghai. The latter is now a Japan headquarters. The Wah Cheng Paper Mill, Soochow, Kiangsu Province, is also in the hands of the Japanese.

It was also learned that the Chian Fibre Container Co., Yangstepoo, an American enterprise, was operating and that the Kincheng Paper Mill at Shanghai was operating half time. The Sun Kee Paper Mill, Nantao, Shanghai, has not been destroyed.

No news has been heard regarding the status of the Ching Wah Strawboard mill, Tientsin, North China, and the Wah Shing Paper Mill, Tsinanfu, Shantung Province.

◆ Glass Marking Ink with Simple Glycerine Formula

When an ink-marking on glass is desired, an effective ink for this purpose is easily made with the following formula:

Glycerine	40
Barium sulphate	15
Ammonium bifluoride	15
Ammonium sulphate	10
Oxalic acid	8
Water	12

All parts by weight. The viscosity may be adjusted with water. Use the mixture in a hood or a well ventilated room. To speed the action, up to 5 per cent of sodium fluoride may be added. (From *Glycerine Facts.*)

◆ Paper Drinking Cups Advertise San Francisco Fair

Paper drinking cups for railroads, steamship lines, airplane lines and hotels are being used to advertise the 1939 Golden Gate International Exposition throughout the United States and possessions.

Co-operating with the $50,000,000 World's Fair of the West, the Zellerbach Paper Company is offering the cups printed in two colors with attractive illustrative perspectives of the Fair and the two Bay bridges. These cups come in four sizes, 3-ounce untreated water cup, 7½-ounce treated soda cup, 10-ounce soda container, and 9-ounce hot drink cup. Cost of printing is borne by the paper company, not by the consumer.

According to E. R. Steiger, Pacific Coast Manager of the Cup Division of the Zellerbach firm, distribution of these cups will be pushed as an important advertising medium for the Fair. Efforts are being made to place the cups in all leading Western hotels, office buildings, and with various spring water companies. Samples are also being sent to Hawaiian and Alaskan firms.

◆ Trace Growth of Institute at Appleton

Students at Lawrence College, Appleton, Wisconsin, recently heard an address by Westbrook Steele, executive director of the Institute of Paper Chemistry, in which he outlined the history, purposes and functions of the Institute, which is affiliated with Lawrence.

Mr. Steele pointed out that nineteen paper mills backed the Institute when it was founded in 1929 while today contribu-

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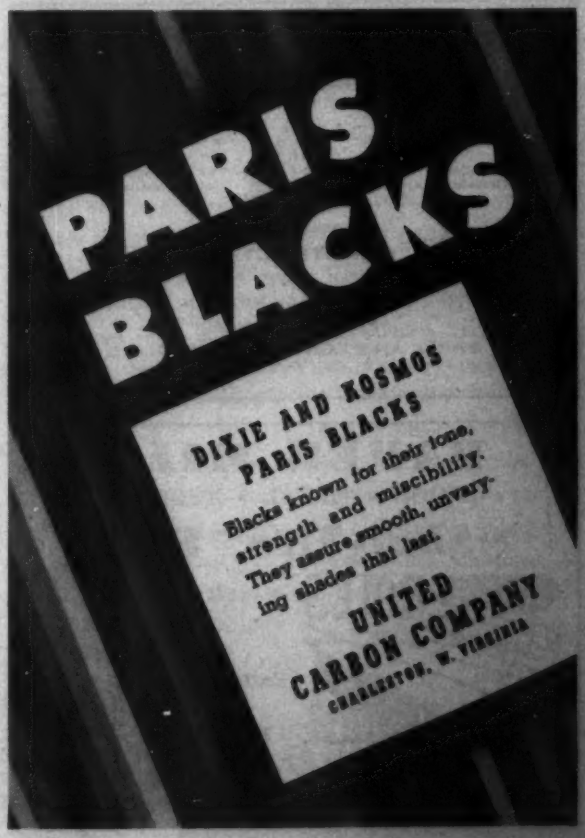
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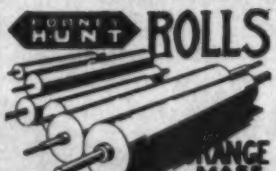

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tions are being received from 65 firms, representing 170 pulp and paper mills in all parts of the United States. While thus far only 15 students have been admitted annually, next fall 17 will be selected from a group of 200 applicants. One of the most important factors in founding the Institute, Mr. Steele explained, was a ruling by the Department of Labor that scientific brains could not be imported into the United States except as "contract laborers and under bond." This ruling created a sudden demand for trained personnel in American industry.

The Institute claims one of the most complete reference libraries in the world. Before this was accumulated, a visit to every institution professing to do anything in the way of training men for the industry revealed that in the whole United States less than $3,000 worth of books on pulp and paper, their chemistry and processes, were collected in any one place. The proportion of openings available for graduates of the Institute never has been less than 7 to 1, according to Mr. Steele.

◆ Import Committee Reports Cases

A case involving the dutiability of paper 18 and 20 inches in width, and 44 and more inches in length has been tried at Los Angeles on the claim of the importer that the paper was duty free as standard newsprint. It was admittedly to be used for wrapping garbage cans. Witnesses for the Government, secured through the Import Committee of the American Paper Industry testified that no newspapers can use paper in such sizes.

A series of cases at Los Angeles in which importers claimed various papers to be duty free as standard newsprint were all abandoned. The cases involved five shipments of school news from Canada, one of heavily loaded colored paper from Norway, one of sheets, some in writing paper sizes, from Norway, two of Canadian poster, four of Canary news from Canada and one of pan paper from Canada.

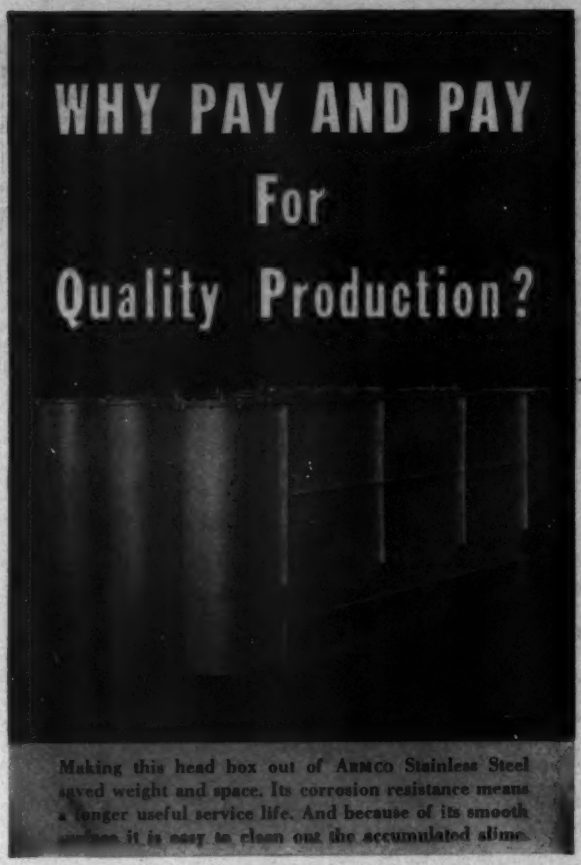
New York Customs officials have decided that counter rolls and ream folded sheet newsprint are dutiable as printing paper because of their form, even though they were of standard newsprint finish. Importers had claimed the paper to be duty free as standard newsprint.

Candy box padding imported from Norway has been held by Boston Customs officials to be dutiable as paper with a surface design at 4½ cents per pound and 10 per cent, plus 10 per cent for embossing. This paper has been imported as greaseproof paper at 3 cents per pound and 15 per cent, and the new rate will be almost prohibitive, offering opportunity for American mills to secure some new business. Tests by Government chemists show that the paper is not greaseproof.

◆ Testing Wrapping Materials for Permeability to Moisture

Wrapping material used to protect bread, cake, potato chips, candy, cereals, tobacco, and many other commodities owe much of their usefulness to their ability to prevent the passage of moisture into or out of the package. Since various wrapping materials differ considerably in their permeability to moisture, the testing of this property assumes an important role. Many workers have made such tests by means of various methods and procedures. The various types of methods used are described and typical data for different kinds of wrapping material are given by F. T. Carson, of the National Bureau of Standards, in an article which appeared recently in *Food Industries*.

The great variety of testing conditions and procedures used by many different workers indicate that the testing of permeability to water vapor is in the formative stage, and that there is need for the development of more uniform procedure and the working out of a standard method. There has been great variation in the testing conditions used, such as moisture gradient, pressure, temperature, area, test period, air movement, and manner of sealing the specimen to the cell. Published results of tests have been reported in about 20 different units. Some order may be brought out of this chaotic condition by the Technical Association of the Pulp and Paper Industry, for this organization has a standard method in process of development.



Making this head box out of ARMCO Stainless Steel saved weight and space. Its corrosion resistance means a longer useful service life. And because of its smooth surface it is easy to clean out the accumulated slime.

True, you can get *quality* production at the expense of rejections and waste. Yet by using Armco Stainless Steels for equipment exposed to corrosive attack, you can achieve it at much less cost *per year of service.*

This durable metal is highly resistant to corrosion and abrasion. Pulp and paper come through clean—free from stains and discoloration. Chemicals used in pulp and paper production have little effect on Armco Stainless Steels. You save money on lowered maintenance costs and longer equipment life.

There is a correct grade of Armco Stainless Steel for nearly every paper mill application. It is ideal for the cheaper grades of paper as well as the finer grades. Let us help you select and apply it—or just specify "Armco Stainless Steel" for new equipment. The American Rolling Mill Co., Executive Offices, 1691 Curtis St., Middletown, Ohio.

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● The significance of a small difference depends on the chain of circumstances into which it enters. A minute difference in chemical quality—considered in the chemicals themselves—may seem trivial. But in any complex industrial process even the smallest qualitative difference in chemical materials may have major consequences.

To hold the edge in competition it is essential that you have at your command the finest materials available for your particular needs. That's why it's good business to place your orders with "General".

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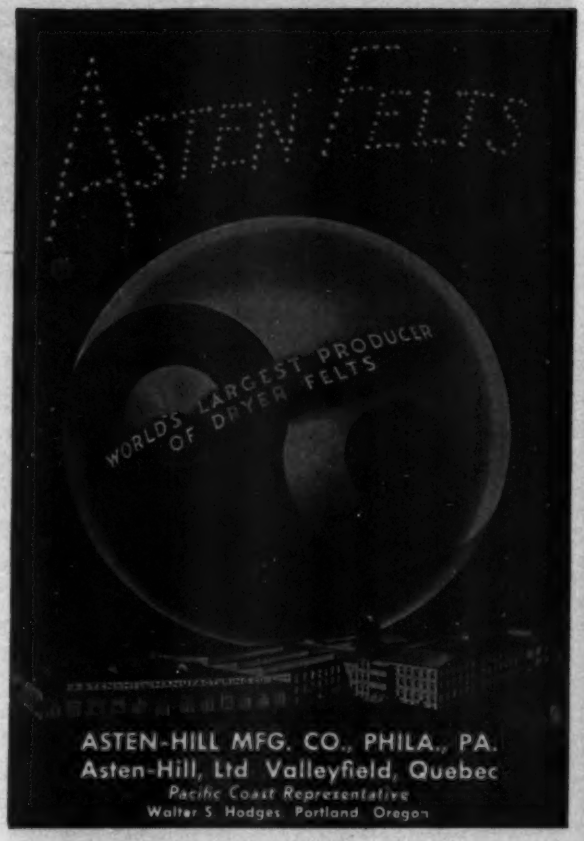
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POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worthwhile practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Use of Draft Gages

If a draft gage is to be of value to the fireman he must read it and read it at frequent intervals. This he will not do if it causes him any inconvenience. It is desirable then that the gage be so located, on a special panel provided for the purpose or on a building column, if one is at hand, that it may be easily seen from in front of the boiler. In many boilers these gages are located on the side wall of the boiler, near the front. This is a second choice position and should be resorted to only where absolutely necessary. A gage is of no value unless it is observed and for this reason the location is of quite as much importance as the gage itself.

◆ Modernizing Old Plants

In spite of the tremendous advances during recent years in power plant design and methods of operation, it is surprising to note in traveling through the country the large number of old plants operating under conditions which are anything but conducive to high efficiency. The equipment one finds in some of these plants was obsolete years ago and while it may have been economical of operation at the time of installation, it certainly is not economical according to present day standards. When one scans the technical literature of today and notes the efforts of engineers, manufacturers, and societies to promote better conditions and higher economy, one is inclined to wonder why such conditions continue to exist in any plant. In these days when boiler efficiencies of from 77 to 85 per cent are common, when water rates of 10 lb. per kw. hr. are within practical reach and with talk of 88 to 90 per cent overall boiler efficiencies by the use of pulverized coal, one is curious to know why many owners still persist in wasting from 5 to 25 per cent of every ton of coal they buy.

Frequently a good deal may be accomplished by the investment of a comparatively small amount of money. Previous to undertaking a remodeling project, a thorough study should be made of existing equipment in order to determine which to discard and which to retain. It must be kept in mind that labor, these days, is an item of considerable expense and any method or machine which will reduce the labor cost should be given preference. It may require the investment of a considerable outlay of capital, but the return due to savings effected will in most cases justify the investment. While first cost must be given due consideration at all times, it must be remembered that operating cost is the all important factor governing profit and loss, and a judicious outlook of the proposition from this point of view will usually indicate the correct solution to any particular problem.

◆ Radiation Losses from Pipes

It has been experimentally determined that each square foot of bare pipe surface will radiate about 3 B.t.u. per hr. for each deg. Fahr. difference between the temperatures of the steam and the outside air, the exact amount varying with the velocity and humidity of the air. If, in any particular case, the essential conditions are known, the heat loss can be estimated in terms of dollars and cents. It will be necessary to determine the square feet of exposed pipe surface; the average temperature of the surrounding air subtracted from the temperature of the steam, will give the temperature difference.

Conditions of operation of the plant will approximately determine the number of hours which steam will be in the pipe line during a period of one year. These factors will give the total B.t.u.'s lost during the year, and this amount divided by 970.4 will give the number of pounds of steam from and at 212 deg. equivalent to this loss. The evaporation per pound of coal and the cost of coal per ton (including cost of handling it and ashes) being known, the money value of the loss is easily derived.

◆ Adulterants in Oil

Rosin oil is cheap and its specific gravity high, therefore it is sometimes used to adulterate lubricating oil. When it has been considerably refined, it can be added in large quantities, without much chance of detection except by a chemist; but since it has no lubricating qualities, the action of the mixture will be unsatisfactory.

Oil containing paraffine will emulsify, in warm water, more readily than if without, and on being allowed to stand in a glass vessel, will show a whitish film between the oil and water when cooled.

Cottonseed and corn oils are sometimes used in lubricating oils, but have merit only as cooling elements, for thread cutting and the like. Their high specific gravity (92 to 93 per cent) makes the mineral oil to which they are added deceptive when too much dependence is placed on viscosity.

◆ Does Your Plant Have Character?

It is a fairly safe criterion in engineering work to assume that the job that looks good is more apt to be correct mechanically than an installation which is sloppy in its make-up. The same thing holds for operation; the clean plant is usually more efficient and safer than the dirty one.

In either case, pride has been stimulated and when pride is aroused, whether in workmanship or in operation, the results are usually better all around.

Some day when you step into your plant, just look at it from the unprejudiced viewpoint of a visitor. Does it strike you that the most is being made of the opportunities? Does it show character? If it does, the fact will probably show up in the way it is maintained.

◆ ADJUST THE CATCH PLATES on a Corliss engine so as to give them sufficient surface on their working edges, and they will wear longer. Also see that the working edges strike each other squarely. If the springs are weak, strengthen them by carefully pressing the ends toward each other in a vise, or get a new set of springs.

◆ ◆

◆ John C. Campbell

John C. Campbell, president of the Newark Wire Cloth Co., Newark, N. J., passed away March 18, after a short illness, at the age of 78. Called dean of the wire cloth industry, Mr. Campbell had been associated with the business for more than sixty years.

Mr. Campbell began work in the Stephens Mill, later known as the De Witt Wire Cloth Co., at the age of 17, subsequently working for the Eastwood Wire Co., Belleville, N. J. He founded the Newark Wire Cloth Co. many years ago and was credited with many new developments in the industry.

Surviving Mr. Campbell are his widow, two sons and three daughters.

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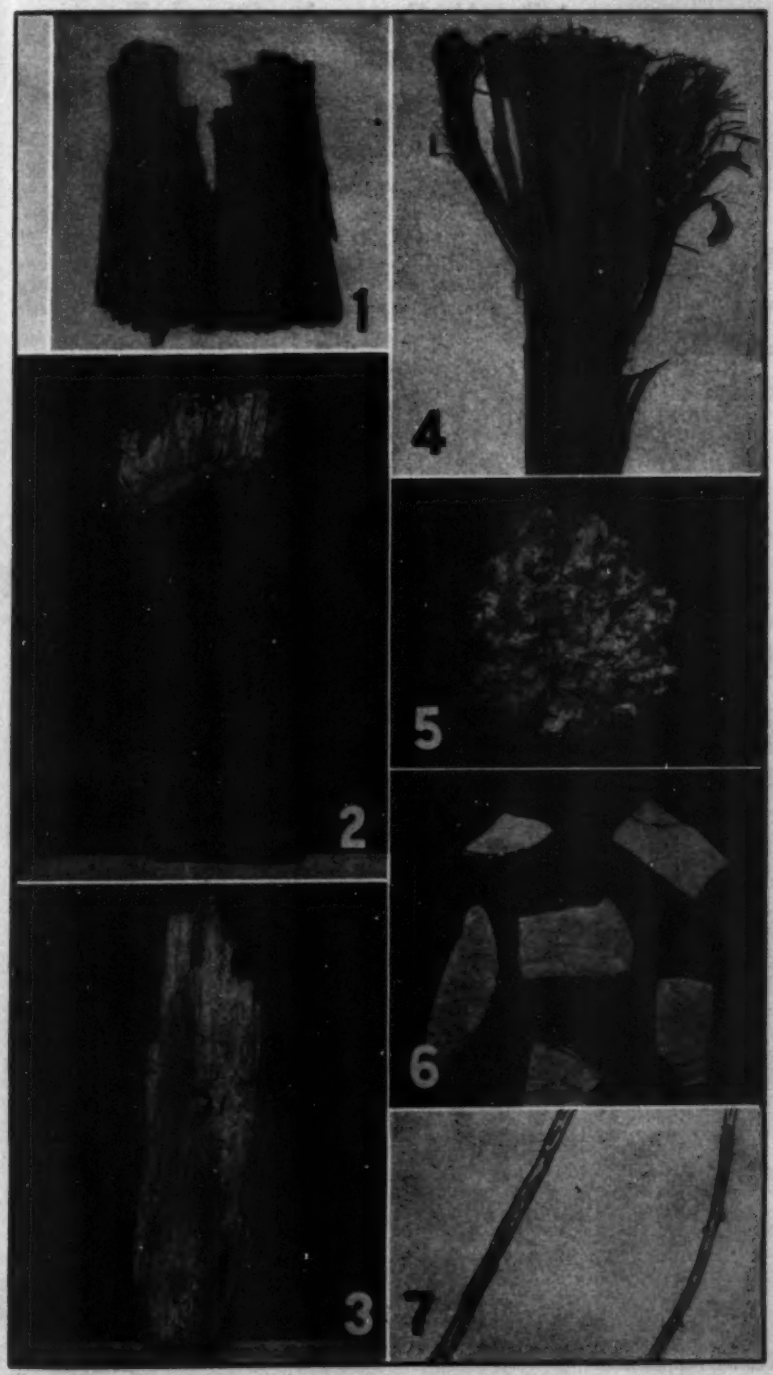
TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

IN THE PAPER INDUSTRY

◆ Possible Pulp Production from Lignite

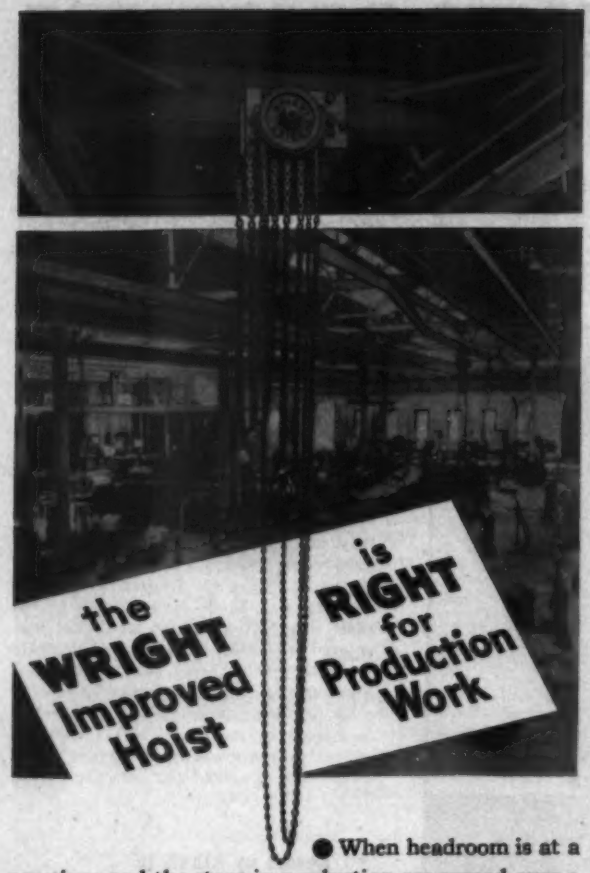
Lignite, which is a disturbing factor in the use of brown coal or briquetting, has been investigated with a view towards its use in the paper industry. About 1.8 million tons are obtained annually. This is another of the many German raw materials now under observation. As lignite is still woody tissue (from the tertiary forests) it was studied with a view towards utilization as a filler in board, or towards its delignification. Previous literature (Braunkohle 21, 400 (1922 *et al*) showed that through natural processes a lignite from Niederlausitz (Figure 1) may be converted partially into a "fossil" cellulose (Figure 2). In Figure 3 is shown the complete natural delignification of lignite—with the formation of cellulose (which has been termed sapperite). To bring about delignification in the laboratory, the pieces of lignite must first be compressed (which causes brooming as shown in Figure 4). In general sulphite cooking was ineffective. In only one case was pulp obtained and this was colored red, but had a high tensile strength (yield 23 per cent). However, alkaline cooking yielded 15-25 per cent pulp (unbleached in Figure 5, bleached in Figure 6), and the fibers (103 magnifications) are shown in Figure 7. R. Beyschlag. Papier-Fabr. 36 (Tech-Wiss. Teil.) 105-8 (1938).



◆ Losses in Alkali in Sulphate Pulp Manufacture

The direct determination of alkali losses in incinerators is a difficult matter. The waste gas volume may be determined and a definite volume of this may be measured and filtered and the alkali content determined (but only approximately) in this way. The most reliable method of determining alkali losses seems to be to determine the total alkali content in a concentrated liquor, entering the furnace, and the total alkali content of the ash leaving the furnace, during a given time period. In this way previous investigators (Sieber, Apler, and Sandberg) have determined losses in Swedish mills corresponding to 20-40 kg. per ton of pulp produced.

Recently, forcing the output in smelting furnaces has led to harmful coatings in boiler and economizer tubes. These consisted largely of Na_2SO_4. Of all the common sodium compounds, Na_2SO_4 is the least volatile. The composition of the alkali lost in smelting furnaces depends in part on the vapor pressure of the various components at a given temperature. These components are Na_2O, NaOH, Na_2CO_3 and Na_2SO_4. (The sulphides and sulphites are oxidized to sulphate or hydroxide. Of these the latter is the most volatile, and the assumption was made that the hydroxide is volatilized and that on cooling of the gases the sulphur dioxide formed from burning of organic mat-



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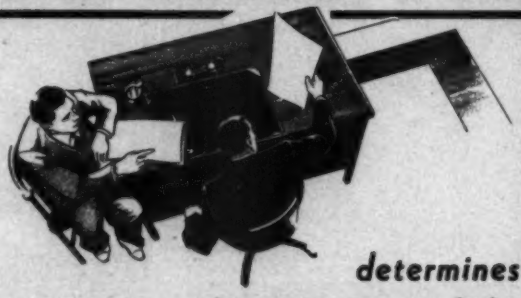

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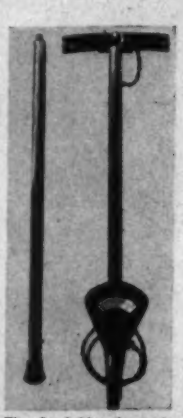

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ter in the black liquor yields Na_2SO_3, which is then oxidized to $NaHSO_4$ or Na_2SO_4. A number of investigators have studied the volatility of NaOH, NaCl, and Na_2CO_3 (and these are reviewed). However, the vapor pressure of Na_2SO_4 has hitherto depended on the approximations of Bunsen. The present investigators have attempted to make more modern vapor pressure determinations on Na_2SO_4, and in the original article their technique is given. These led to a confirmation of the course of alkali losses outlined above. The type of cooling system in part determines the final steps of the reaction. In the Wagner (or similar) furnaces, the sprayed black liquor entering the furnace often results in the formation of very fine particles of ash, which may easily be mechanically carried off by the gases of combustion. In such cases dust losses become an important part of the total losses in alkali. H. Liander and G. Olsson. Ing. Vetensk Akad. Tidshr. No. 4, 145 (1937); through Papier Fabr. 36 (Abstracts) 27 (1938).

◆ Chlorination of Plant Tissues

The first portions of this work, giving the methods of chlorination, were abstracted in THE PAPER INDUSTRY (May 1937, 227-9). This present paper completes a long study. On chlorination finely divided spruce wood retained 12 per cent chlorine, while spruce chlorolignin contained 30.9 per cent chlorine and retained 15-20 per cent after cold digestion with dilute NaOH. The chlorolignins formed from beech, wheat straw, corn leaves, and cornstalks contained respectively 27.1, 24.7, 22.1, and 23.4 per cent chlorine, and other chlorolignins fell within the range of 20-30 per cent Cl, which seems to be intermediate between the chlorine content of chlorinated tannins and that of certain chloromonocyclic phenolic derivatives. For example, the chlorine content of chlorinated tannic acid, mimosa tannin and gallic acid were respectively 12, 15 and 12 per cent, while that of pyrocatechol was 45 per cent. Calculated on the basis of the original unchlorinated material, the investigators determined the total chlorine consumption (A), the chlorine liberated as hydrochloric acid (B) and the organic chlorine (C), for two types of lignin, tannic and gallic acids, rosin, levulinic acid (D), cotton, filter paper, soluble starch, sucrose, xylan (from beech wood), inulin, and glucose and fructose. In the two last named, the chlorination was carried out under a variety of conditions. (A), (B) and (C) were lowest for cotton. Fructose and glucose usually liberated about 50 per cent of their weight as (B) (unless special conditions were used). Starch, xylan, sucrose and inulin were intermediate between the monosaccharides and cellulose. The lignins, however, showed 149-217 per cent (A), 115-173 per cent (B) and 34-44 per cent (C). The authors think that the liberation of HCl has a technical significance since it acts further on the sugars (however, the conditions of the various experiments are more drastic than are usually met with).

HCl acting on pentoses gives a humin (here used as a group term) (E) and furfurol. Acting on the hexoses, HCl gives (D), (E) and CO_2 and H_2O (derived from formic acid). Furthermore, E and furfurol are attacked by chlorine. In other words, the products obtained when plant tissues are hydrolyzed cause further chlorine consumption. (Here, again, however, emphasis should be placed in the fact that the chlorination periods are much longer than those met with in the laboratory or the plant.) When glucose or fructose is treated with cold H_2SO_4 or HCl, the amount of the products which separates is usually negligible. However, subsequent dilution and heating gives rise to (E). For example, hot 1 per cent HCl gave 15 per cent, and warm 38 per cent HCl gave about 50 per cent (E), when fructose was under experiment. Besides, 27-29 per cent (D) could be obtained from glucose and fructose by heating with dilute acids. Other products are also formed, but these were not identified. Furfurol itself, after long treatment with cold 38 per cent HCl, followed by warming (55-60 deg. C) may give as much as 88 per cent (E). Chlorination of (E) from the sugars gave products quite similar in properties to those obtained from lignin.

However, the chlorolignins contain methoxy groups, whereas these are absent from the chlorohumins. The author gives possible molecular formulas of various humins and chlorohumins, which are in accord with (B) and (C) data. For these, the reader is referred to the original. On chlorination of the simple sugars in the presence of 20 per cent HCl, no (E) separates. This disposes of a hypothesis of Hilpert that chlorolignins from wood or straw are actually secondary products formed from the sugars during the chlorination. However, this does not (according to the authors) invalidate the theory that native lignin may be formed in the plant by water removal from sugars, and is not out of harmony with Hilpert's main hypothesis. Chlorination of sugars in HCl also gives small amounts of oxalic, fumaric, (D) and chlorolevulinic acids. A good test for lignification is the instantaneous orange coloration of a tissue with Cl. (Furfurol and sugars are also colored orange, but the rate is somewhat slower.) Cross and Bevan's lignin reactions appear to be due to carbohydrates rather than to the lignin. O. A. Müller and F. Stalder. Papier-Fabr. 36 (Tech-Wiss. Tl.) 81-93 (1938).

◆ Detection and Determination of Glycerine in Paper

The paper (e.g., 1 gram of parchment paper) is extracted successively with 3 thirty cc. portions of distilled water. The combined extractives are diluted to 100 cc. and 2 cc. of this solution are added to 4 cc. of a 0.1 per cent solution of anthrone in concentrated sulphuric acid. The mixture is gradually heated to 170-175 deg. C, when the reddish yellow coloration reaches its

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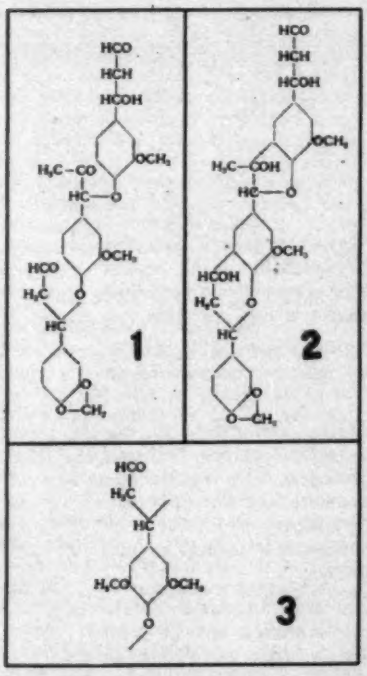
highest intensity, and a marked and very characteristic fluorescence also develops, which becomes enhanced by further dilution with concentrated sulphuric acid. It is this strong reddish yellow fluorescence that characterizes dilute glycerine solutions (up to dilutions of .000002 g. per cc.). The color reaction depends on the formation of acrolein, which combines with anthrone and oxygen to form benzanthrone (and water). A simple synthesis of anthrone from pure anthraquinone is outlined. The usual water soluble components when treated under the conditions outlined above give only a faint yellow coloration and no fluorescence, only such substances as epichlorohydrin, and triacetin (which readily yield acrolein) give a reaction similar to glycerine. But these are normally absent from paper. Franz. Schutz. Papier Fabr. 36 (Tech. Tl.) 55-6 (1938).

◆ Lignin

When spruce lignin is treated with aqueous NaOH at 170 deg. C., followed by methylation and then by oxidation by $KMnO_4$ about 24 per cent of veratric acid (I) (or secondary product from this acid) and 5 per cent isohemihemic acids (II) are obtained. However, control experiments show that under these conditions of oxidation from 30-50 per cent of I and 90 per cent of II are actually destroyed. This leads the author to calculate the corrected figures



of about 38 per cent I and 72 per cent II (totalling 110 per cent, whereas the theory would be 115 per cent of the weight of lignin taken). Based on this, Dr. Freudenberg has given schematic formulas for lignin, which include an end piperonyl group (since the lignin yields 3 per cent formaldehyde). These abbreviated schematic formulas are shown in Figures 1 and 2. Lignin, it is claimed, is a mixture of these. Beech lignin appears to be more complex. Here the treatment outlined above furnishes trimethyl gallic acid besides (I) and (II). Making allowance for losses on oxidation, the beech lignin yields 12 per cent trimethyl gallic acid, besides 4 per cent (I) and 18 per cent (II). This still leaves a large proportion of the lignin unaccounted for. When ethylation was used instead of methylation, the ethyl ethers of vanillic and syringic acids were formed. Beechwood treated directly with diazomethane gave 4 per cent of (I). The isolated cup raxam lignin yielded 1.3 per cent formaldehyde. Figure 3 shows a possible structural unit in beech lignin. Both spruce and beechwood lignin are probably combined with hemicelluloses of the wood rather than with cellulose. Karl Freudenberg. Papierfabr. 36 (Tech. Tl) 34-6 (1938).

◆ Differentiating Pasteboard from Unlaminated Carton

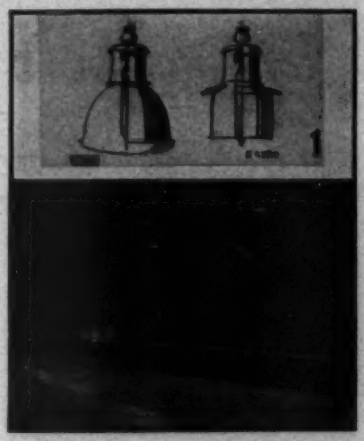
Ordinarily starch is used in pasting together the different sheets to form pasteboard. The test consists in tearing a cut strip, at an angle to the surface, so that all layers are exposed. The strip is then immersed in a very dilute solution of potassium iodide, iodine and glycerine. If two layers have been pasted together, there will be one dark blue line. The number of blue lines is always one less than the number of sheets used in making the pasteboard. A single layer will not show any line, or will be stained faintly blue throughout (provided starch has been used in its manufacture). Gustav Faldner. Wochbl. Papierfabr. 69, Tech. Tl., 237 (1938).

◆ Qualities and Uses of Wood Pulp

This paper strives to simplify the difficult subject of classifying and grading pulps. Very brief reference is made to the various pulping processes and to treatments after pulping. The grading process is necessarily not sharp or well defined, but the author describes briefly the terms: extra free, free, medium free and slow (as applied to mechanical pulps) and shows how these grades are used. Bleached mechanical, and semi-chemical pulps are also briefly treated, as are various grades of sulphite, kraft, and soda pulps. One table presents a descriptive summary, for example, of bleached kraft characteristics and uses. The author has also given extensive tabulated evaluations of average physical and chemical properties in the case of wet mechanical, dry sulphite (beaten and unbeaten) and dry sulphate (beaten and unbeaten) pulps. For these detailed numerical data, the original should be consulted. Besides values obtained by the use of the Valley Beater, parallel experiments were made using the Lampen C. L. method, which resulted in marked differences in physical properties (for the same degree of freeness), finally the author discusses pulp quality as related to the physical properties, chemical properties, and components of the pulp. Fourteen recent literature references are given as well as a table giving the estimated world consumption of pulp and paper in 1936. John S. Bates. Paper Maker and British Paper Trade J. 95, (Tech. Section) 38-49 (1938).

◆ Advances in Illumination

This is a brief descriptive article which places special emphasis on the use of sodium vapor lamps (where color tones are of no special importance—as



in power plants) and of mercury vapor lamps which (while less efficient) may be used in conjunction with ordinary incandescent lamps to give a satisfactory mixed light. Figure 1 shows the sodium vapor lamps used, and Figure 2, their use over a loading platform. W. Hahn. Wochbl. Papierfabr. 69, 203-4 (1938).

◆ Distribution of Fillers in the Sheet

The previous findings of Schilde (Papier-Fabr. (1930), 409 (etc.)) that ordinarily the filler is concentrated not on the wire side, but on the upper portion of the sheet have been confirmed by numerous control tests carried out in the Zentral Laboratorium der Feldmühle A. G. A simple procedure is used. Two strips of the paper to be examined are moistened and glued (with a carefully selected neutral glue) to a polished metal or glass plate. In one case the wire side contacts the plate; in the other case the upper side of the sheet is glued to the plate. The plate is then cautiously ground down to a desired thickness, and polished by using a series of high grade carborundum papers (increasing, as the grinding goes on, in fineness of particle size). A moist filler paper is then laid over each abraded sample strip to loosen it, and this is followed by washing with warm water to remove the strip from the plate. The samples are dried, examined for thick or thin spots (which are cut out), their thickness measured, and then incinerated. The ash content of each strip is thus determined and compared

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with that of a complete strip of the original, untreated paper. Thus clean-cut data are furnished regarding the distribution of loading materials.

In all cases the filler retention was lowest nearer the wire side of the sheet, although in a few instances a fairly even distribution was noted. It was found that in the case of art, offset, and lithographic printing, it was best to use the wire side of the sheet, since this prevented the removal of miniature paper particles during the printing process (such removal being associated with too much loading material). In copper plate engraving, where a high filler content is indicated, the upper side of the sheet was found best. This was also true in printing wall papers. Franz Schutz. Papier-Fabr. 35 (Tech. Tl.) 516-8 (1937).

◆ Safety Paper

One of a series of articles on advances in special paper manufacture (Cf. THE PAPER INDUSTRY, 1938, pp. 1313-5). It deals very briefly with recent patents covering forge-proof and counterfeit-proof papers. A Foulon. Wochbl. Papierfbr. 69, Tech. Tl. 199-201 (1938).

◆ Differences in Pine Heartwood and Sapwood

Ordinarily the distinction between sapwood and heartwood is the darker color of the latter. These color differences may, however, be very slight (especially when the pine is green). A good staining reaction involves bis-diazotized benzidine, which turns sapwood yellow, whereas it ordinarily colors heartwood a dark red. According to the authors, this stain is specific for pinewood (among the common woods at least) and serves to differentiate it very rapidly from spruce, oak, beech, larch and fir. However, the stain (being a diazo compound) is unstable and must be prepared prior to the test. J. E. Koch and W. Krieg. Chem. Ztg. 62, No. 15, 140-1 (1938).

◆ Pulp from Hardwoods and Other Raw Materials

Beechwood, which is receiving so much attention as a raw material in Germany, is best delignified under the following conditions. A 4 per cent NaOH solution was used, with 40 grams NaOH for each 100 g. air-dried wood. The cooking period was 4 hours at 160 deg. C. Yields 48-49 per cent. Below this alkali concentration the delignification was very incomplete, while above 6 per cent NaOH the fiber is damaged, and the process becomes uneconomical. A long series of bleaching studies indicated that beechwood pulp cannot be bleached satisfactorily in 1 or 2 stages and the authors tried a rather unusual series of combinations of bleaching agents. These included the usual NaClO, $NaHSO_3$, sodium perborate and nitric acid. Some twelve combinations were tried. The following is a single example which gave a white pulp that did not darken on drying.

Using a 5 per cent stock density, NaClO solution (with 0.44 per cent active chlorine) was allowed to act on the pulp for 0.5 hour. This was followed by acidification with dilute H_2SO_4. Bleaching was then resumed with the original NaClO solution for 0.5 hr., followed by successive treatments with 1:5 $NaHSO_3$ (for 15 minutes), hot 0.1 per cent sodium perborate (for 10 minutes), NaClO solution (for 0.5 hr.) and finally $NaHSO_3$ (for 15 minutes). This multiple bleach led to a pulp containing 88.5-89.1 per cent alpha cellulose, 0.4 per cent ash, 0.75 per cent lignin, copper numbers ranging from 0.78 to 0.83 and a (Gibson) viscosity of 15.8-16.4.

The other procedures yielded white pulps which showed very divergent data. Perhaps the best of these was a seven stage process using NaClO in successively diminishing amounts followed by $NaHSO_3$, and finally by 0.5 per cent HNO_3. Here the pulp contained 92.6 per cent alpha cellulose and a Gibson viscosity of 33. In order to save NaOH in the alkaline cook, 100 grams beech chips were pretreated for 2 hours at 140 deg. C. with 20 g. lime and 500 cc. H_2O. This was followed by washing with water and dilute acetic acid. Such pretreatment removed 10 per cent of the wood. When this was followed by an alkaline cook (as outlined above) 0.11 g. NaOH per gram of wood was actually consumed. The pulp, bleached by the first procedure (above described) showed 90-7-91.4 per cent alpha cellulose, 0.21 per cent ash, Cu. number range of 0.41 to 0.58 and 19.3 (Gibson) viscosity. Even when the beechwood was out of very low grade, bleachable pulps could be obtained. The same general procedures, when applied to eucalyptus wood, gave results almost identical with those obtained in the case of beech. However, oak's lower yields could never be bleached to a satisfactory degree of whiteness, unless the original wood had been extracted with hot water prior to the actual digestion.

The authors also made pulping experiments with hemp chaff and oat hulls, which (under conditions of pulping similar to those used with beech) gave 40 per cent and 38 per cent yields respectively. With flax chaff, however, the digestion required 6 hours at 180 deg. C., and the yield was only 33.5 per cent. Bleaching (by using combinations of NaClO and $NaHSO_3$) gave white pulps, but their cellulose contents were never very satisfactory and usually the copper numbers were approximately 2.0 (except in the case of oat hull pulp, where the Cu. No. was 0.88). These hulls could also be delignified by a much milder treatment, using a 2 per cent NaOH solution and 20 grams NaOH per 100 grams of hulls, cooking for 3 hours at 120 deg. C. Large scale experiments, based on the above procedure in the case of beechwood gave satisfactory yields of pulps, which, however, showed some unexpected difficulties when they were used in rayon manufacture. E. Wedekind, H. Grasshof, and O. Müller. Papier-Fabr. 35 (Tech. Tl.) 513-6 (1937).

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PAPERMAKING PATENTS

IN THE UNITED STATES

Inquiries with reference to any of these patents should be addressed to James Atkins, Munsey Building, Washington, D. C.

Compiled by James Atkins, Registered Patent Attorney

20,687—Means for Arresting Dust and Fluff from Machines or Appliances for Cutting Paper and Other Fibrous Materials. Thomas Hamilton Grozier, Greenwich Point, Sydney, New South Wales, Australia. Original No. 1,986,726, dated January 1, 1935, Serial No. 655,638, February 7, 1933. Application for reissue December 11, 1936. Serial No. 115,448. In Australia March 3, 1932. 8 Claims. (Cl. 164—60). In machines used in cutting paper, cardboard or other fibrous materials, embodying a suitable electric motor and a cutting element operated thereby; means for arresting and collecting dust, fluff, and minute particles formed by the cutting element comprising a casing enclosing the cutting element, a slot for the cutting element in the casing, fan blades mounted on both sides of the cutting element, an air inlet in the casing, an outlet on the casing, a dust-extracting and collecting chamber, a conduit connecting the outlet of said casing with the said chamber, and an air outlet on the dust-extracting and collecting chamber.

2,111,440—Paper Machine Distributing Apparatus. Jerome P. Strasser, Hampshire, Ill., assignor to Stein, Hall Manufacturing Company, Chicago, Ill., a corporation of Delaware. Application December 9, 1937, Serial No. 178,934. 4 Claims. (Cl. 92—40). In combination with a Fourdrinier paper making machine, means for distributing material to a point on the wire of the paper machine, said means comprising a vessel containing the material to be distributed, means rotating in said vessel in contact with said material at its lower side, distributing means adapted to remove the material from the rotating means during rotation of the latter and cause said material to flow over said distributing means by gravity in an inclined path toward the wire web of the paper machine, means for controlling the height and volume of the material on the rotating means comprising an elongated member extending lengthwise of the rotating means in a manner adapted to form a dam ahead of the distributing means, and means for coordinating the speed of the rotating means with the rate of flow of the wire web of the Fourdrinier machine.

2,111,833—Table Roll Structure for Paper Machines. Earl E. Berry, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application December 23, 1935, Serial No. 55,753. 9 Claims. (Cl. 92—44). In a paper making machine having a forming wire, a battery of small diameter table rolls supporting said wire, a gear box mounted alongside of said paper machine having a plurality of drive shafts extending therefrom, separate flexible couplings for joining each table roll with a separate drive shaft extending from said gear box, and means for rotating said drive shafts at the same rate of speed to drive the table rolls at identical predetermined speeds.

The method of supporting a forming wire which comprises disposing elongated small diameter table rolls beneath the wire, surrounding the underside of each roll with an open topped bearing shell extending more than 180° around the roll, said shells having interior diameters larger than the external diameters of the rolls to loosely journal the rolls therein and flowing a fluid into the shells beneath the rolls under sufficient pressure to raise the rolls off of the bottoms of the shells.

2,111,834—Process and Apparatus for Drying Fibrous Webs. Earl E. Berry, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application January 2, 1936, Serial No. 57,216. 13 Claims. (Cl. 92—49). The process of removing liquid from fibrous webs which comprises conveying a wet web on an absorbent carrier, removing the web from the carrier, sucking liquid from the carrier alone, recontacting the web with the carrier while the same is still subject to suction, and squeezing the web to force liquid therefrom for absorption into the carrier.

2,111,835—Paper Machine Table Roll Structure. Earl E. Berry, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application May 20, 1936, Serial No. 80,762. 8 Claims. (Cl. 92—51). In a roll structure for supporting a web forming wire, a journal for rotatably supporting a roll intermediate its ends comprising a pair of elongated spaced opposed bearing segments defining together an open-topped cylindrical journal, and a plurality of means spaced along the lengths of the segments, each of said means acting on both bearing segments to draw the same together as desired whereby the journal is adjustable in size along its length.

2,112,540—Art of Paper Making. Frank J. McAndrews and Lester Long, Philadelphia, Pa., assignors to Charles McDowell, trading as McDowell Paper Mills, Philadelphia, Pa. Application October 1, 1937, Serial No. 166,860. 3 Claims. (Cl. 92—40). A method of making glassine, greaseproof or imitation parchment paper containing modifying materials uniformly distributed throughout its entire cross-section, which consists in pouring a quantity of glassine stock on the wire of a paper machine, causing an initial amount of the water to drain through the wire so as to deposit a partially formed non-self-sustaining wet web of paper on the wire, directing a solution containing the modifying materials in the form of a finely atomized spray against the upper surface of the web in the direction of movement of the web prior to the application of any substantial amount of suction thereto, and removing the water of the solution simultaneously with the water normally contained in the web.

2,112,562—Process of Deinking Paper. Harry C. Fisher, Cincinnati, Ohio, assignor to The Gardner-Richardson Company, Middletown, Ohio, a corporation of Ohio. Application August 20, 1934, Serial No. 740,585. 12 Claims. (Cl. 92—9). The process of deinking paper which comprises bringing a material of a character generally similar to the oily vehicle of the original printing ink into intimate contact with the ink on the paper in the presence of a small amount of water, the quantity of water being such that the paper remains in a non-fluent condition with the water acting to reduce the time required for thorough intermixture with the ink vehicle and avoiding oil-soaking of the paper, agitating the paper in the presence of said material and added quantities of water to cause a separation of the ink from the paper, and collecting particles of said material together with the ink on top of a body of water.

2,112,576—Preparation of Cellulose Xanthate Solutions. George A. Richter, Berlin, N. H., assignor to Brown Company, Berlin, N. H., a corporation of Maine. Application March 1, 1937, Serial No. 128,492. 6 Claims. (Cl. 260—100). A process of producing viscose, which comprises treating cellulose fiber of the nature of chemical wood pulp and cotton with caustic soda solution containing an oxidant under conditions of caustic soda and oxidant concentration, temperature, and time to yield a fiber having an alpha cellulose content of about 87 to 93%, a beta cellulose content of about 6 to 12%, and a viscosity less than 1; washing the fiber substantially free of such treating solution; and mixing the fiber with caustic soda solution and liquid carbon bisulphide in amount to xanthate the fiber substantially completely and to form viscose.

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The COMMERCIAL OUTLOOK

New York, May 2, 1938.

WITHOUT question, there is a better tone in the general business situation, and confidence among manufacturers and merchants appears returning. The feeling is growing that the bottom of the present recession has been definitely reached, and in at least some spots on the industrial horizon are indications of a slight turn upward in activity. Developments in the national capital have been favorable, in part at any rate, and business interests are beginning to believe that gradual improvement will be registered over the next several months.

Within the paper manufacturing industry, operations are proceeding at little change in pace. Mills appear to have struck a level of production from which there is little digression—no falling away nor any further climb. One thing seems certain and that is that the paper now being manufactured is moving directly into consuming channels, and along with it some of the inventory held by mills. Raw material stocks are being steadily reduced; on the whole, the statistical position of the industry is well on the mend. Seasonal pick-up in demand has quickened the movement of some classes of paper, and buying by consumers, converters and jobbers is of healthy character—confined almost entirely to actual requirements.

Readjustments downward in quotations of some classes of paper have been recorded, brought about, it is said, by reason of the fact that individual manufacturers were losing their proportionate share of available business and, with competition growing keener, had sought to regain their positions by price cuts. In each case, however, the reductions became general. No further declines are held likely to occur during the balance of the current quarter.

Reduction of $10 a ton in bristol board prices has been promulgated by manufacturers, following a cut of $10 a ton in writing papers shortly before. Kraft bag paper prices have been lowered $5 a ton by leading producers, and reduced quotations have been announced on envelope papers, generally $5 a ton off on spot purchases.

The new price on bag kraft is $70 a ton. On wrapping kraft, the former open market basis was $85 a ton, less 5 per cent for the functional discount, which, in competition, had become fairly generally applied. Some selling, however, had been reported at figures somewhat below the open market. The new price is $80 net.

The monthly index of newspaper advertising for March registered a gain of 2.8 per cent over February, but a decline of 13.7 per cent from March, 1937, according to Printers' Ink. Farm paper advertising dropped 11.3 per cent below February and 16.9 per cent under March of last year. Direct mail fell back 5.8 per cent in March from the similar month of last year.

Production of newsprint in North America during March continued at the low rate which marked the first two months of the current year. March output ran moderately ahead of the total for the shorter month of February, but was almost identical with the January production. Despite the low rate of output, shipments continued to run below the output, so that stocks at mills continued to rise, according to the News Print Service Bureau report.

Newsprint production in Canada in March amounted to 224,604 tons, a decrease of 76,506 tons or 25.4 per cent below the 301,110 tons produced in the same 1937 month. United States mills produced a total of 67,864 tons in March, against 82,576 tons a year ago, a drop of 14,712 tons or 17.8 per cent. Output in the United States and Canada reached 292,468 tons in March, representing a decrease of 91,218 tons or 23.8 per cent contrasted with 383,686 tons in March, 1937. Total North American production in March was 317,822 tons, a drop of 96,484 tons or 23.3 per cent from an aggregate of 414,306 tons in the same month a year ago.

Newsprint output in Canada during the first quarter of 1938 totaled 649,705 tons; in the United States, 201,735 tons, and in all of North America, 922,218 tons. Last year in the same three months production was 864,333 tons in Canada, 234,653 tons in the United States, and 1,185,870 tons in North America. Thus, production this year so far has been 24.8 per cent less in Canada than in the corresponding period last year, 14.0 per cent lower in the United States, and 22.2 per cent less in all of North America.

Mills in the United States manufactured a total of 282,248 tons of paperboard in February, compared with 268,121 tons in the preceding month and 373,431 tons in the similar month a year ago. Board output during the first two months of the current year amounted to 550,369 tons, a sharp decline contrasted with 739,096 tons in the corresponding time of 1937 yet a rise above the 542,317 tons in the same two-month period in 1936, according to the Census Bureau's monthly summary. Board output was at 59.8 per cent of mills' rated capacity in February last, against 54.7 per cent in January this year and 90.0 per cent in February last year.

New orders received by manufacturers during February called for a total of 273,651 tons of board, compared with 269,367 tons in the month preceding and 386,781 tons in February, 1937. Unfilled orders held by mills at the end of February were for 72,832 tons, against 79,595 tons a month before and 236,011 tons at the end of February last year.

Shipments of prepared roofing from manufacturing plants in the United States increased in February over the preceding month but were below the shipments in the corresponding month of 1937, according to the U. S. Census Bureau. February shipments totaled 2,286,730 squares of all types of prepared roofing, against 1,831,858 squares in January last and 3,576,448 squares in February a year ago. The total for the first two months this year was 4,118,588 squares, compared with 5,962,676 squares in the similar 1937 period.

◆ ◆

◆ Lincoln Co. Establishes Subsidiary in Australia

The Lincoln Electric Company, Cleveland, Ohio, has established a manufacturing subsidiary to be called Lincoln Electric Company (Australia) Pty., Ltd., at Sydney, Australia, it was announced recently by J. F. Lincoln, president of the company. A suitable factory has already been purchased and arc welding equipment manufacturing operations will begin in a year's time.

While in Australia, Mr. Lincoln gave a series of addresses before various engineering groups on developments in the art of welding. Great interest was indicated by the enthusiastic attendance wherever he spoke. He is expected back in the United States in May.

◆ Approve Two Simplified Practice Recommendations

The required degree of acceptance by the industry has been accorded the current revision of Simplified Practice Recommendation R92-32, Hard Fiber Twine and Lath Yarn and is effective April 1, 1938, according to an announcement of the Division of Simplified Practice, National Bureau of Standards. The revised recommendation will be identified as Simplified Practice Recommendation R92-38.

In addition it is announced that the current revision of Simplified Recommendation R146, Corrugated and Solid Fiber Boxes for Canned Fruits and Vegetables, has been accorded the required degree of acceptance and was effective March 1, 1938. This revised recommendation will be identified as Simplified Practice Recommendation R146-38.

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Domestic RAW MATERIALS

◆ Papermaking Rags

To report that the market for papermaking rags is dull is describing the situation reservedly. There is surprisingly little activity in the market. As a matter of fact, scarcely a market exists, aside from occasional purchases of small quantities which mills suddenly or otherwise find they definitely need. Demand is so slow and of such light volume that the market is steadily easing of its own weight, prices are gradually, yet persistently moving to lower levels, notwithstanding broad declines during the past few months which have brought present market values down to the lowest points known in a long time.

Paper manufacturers do not need rags and therefore are not acquiring them. Dealers and importers, faced with doleful disconcerting marketing conditions and finding it extremely difficult to accomplish sales, are obviously in some instances letting go of rags in hand for whatever they can secure in the way of price. However, it should be said there is no unusual pressure to sell. Apparently dealers have learned through recent experience it avails them nothing to press mill customers for orders, and are not pushing rags onto the market, in a large majority of cases pursuing a waiting policy while possessed of the belief that only improvement in the paper market will cause paper manufacturers to increase their purchases of rags.

With actual business in rags as limited as it happens to be it is difficult to ascertain what market price levels actually are. Prices of most grades are mainly nominal. New cuttings are gradually sagging in value. It is reported that new No. 1 white shirt cuttings have been offered to fine paper mills at 6.50 cents a pound f.o.b. shipping points, and it appears very probable that in some exceptional instances dealers have expressed willingness to accept less; at least slightly less, than this price. Export demand for these rags has subsided, which has added to the price weakness. For a considerable period, until recently, the call from Europe for white shirt cuttings served to sustain market prices of these rags relatively above many other grades of new cuttings.

Fancy shirt cuttings, which embrace a variety of packings and therefore present a fairly broad scale of quotations, are around 2.50 cents per pound at dealers' shipping points. New soft unbleached muslins are reported available at 6.25 cents a pound at shipping points, maybe at a little less; new blue overall cuttings at 5 cents, light silesias at 4.50 cents, bleached canton flannels at 6.50 cents, light flannelettes at 5 cents, washables at 2 cents, new white linen cuttings at 9.50 cents and grey linen at 9 cents.

Roofing felt mills are securing all the rags wanted from domestic sources and consequently are remaining entirely out of evidence as purchasers of imported roofing stock. It is known that first-grade foreign dark cottons have been offered to them, in some cases, at around 1.25 cents to slightly lower per pound ex dock basis, without sales materializing. Domestic roofing rags are selling in the East at 65 to 70 cents per hundred pounds for No. 2 grade at points of shipment; it is reported mills adjacent to New York City are obtaining these rags at 70 cents delivered for supplies trucked by motor. No. 1 domestic roofing stock is proportionately higher in price at about 1.20 cents per pound for straight satinet garments at dealers' points.

◆ Rope and Bagging

Demand for old rope and scrap bagging from paper mills is close to nil. Consumers in some instances are now and then absorbing a few carloads from their absolutely regular suppliers, but open-market demand practically does not exist. Prices are largely nominal at 3 cents per pound at dealers' shipping points for No. 1 domestic old manila rope, 2.75 cents ex dock New York for foreign manila rope, 1.40 cents for No. 1 scrap bagging, and 60 cents a hundred pounds for roofing bagging. A little flurry of buying of old gunny bagging has occurred, but not by paper mills. Respinners in the South have purchased this material at around 2.25 cents a pound for No. 1 foreign and 2.10 cents for No. 1 domestic gunny on an ex dock and f.o.b. New York basis.

◆ Mechanical Pulp

With inactivity prevailing, the market for mechanical wood pulp shows little or no change of a definite character. There is a movement of pulp against contracts, but demand of a spot variety is reported next to nil. In short, consumers are getting along with stocks on hand or deliveries against back commitments, and are refraining from additional purchasing. Domestic and Canadian manufacturers quote around $35 per ton for moist groundwood delivered consuming mills in northern United States, the delivered basis depending on the haul from producing centers. Canadian groundwood brought down by vessels is priced at $30 ex dock New York or other American Atlantic ports. Scandinavian groundwood holds to quotable levels of $31 to $32 per short ton for prime dry and slightly higher for moist ex dock American Atlantic seaboard.

◆ Chemical Pulp

Demand of a current character for chemical pulp being close to a standstill as consuming mills are amply supplied with pulp in hand and on order, domestic producers are gratified to have contracts against which they are shipping some of their product. It is no secret, however, that domestic pulp mills have had to appreciably curtail operations. Their market has narrowed sharply since pulp began to pile up some months ago in consuming mills and on port docks.

Despite the dull market situation, prices of domestic pulps have a steady undertone. Manufacturers are adhering to the contract bases put into effect the first of the year and reaffirmed for the second quarter period. There has been some talk of pressure to market kraft pulp of southern origin, with some low prices rumored, but if sellers have granted deep concessions, apparently they have well covered up their actions.

◆ Old Paper

No improvement has developed in the waste paper market situation. The condition is bordering onto desperation as an outcome of far too little mill demand to commence to take up the supply which dealers have in hand and seek to sell. This is particularly true as regards low or bulky grades. The better qualities of old paper are in a relatively more favorable price position; while the undertone is soft, at any rate prices are registering but slight further recession. The problem item is mixed paper. The situation in this material is so bad in the East that it is a fact dealers in some instances have given mixed paper away to rid themselves of it. The nominal price of No. 1 mixed is 7½ to 10 cents per hundred pounds f.o.b. New York, when sales outlets are to be found. Folded news is 25 cents per hundred pounds f.o.b. New York, old corrugated boxes also 25 cents, No. 1 heavy books 45 cents, No. 1 old kraft 50 cents, white ledgers 1.05 cents a pound, colored ledgers 65 cents per hundred, No. 1 hard white shavings 1.85 cents a pound upwards, according to quality; No. 1 soft white shavings 1.60 cents, and No. 1 hard white envelope cuttings 2.25 cents.

◆ Pulpwood

Pulpmakers manifest little disposition to purchase wood in the open market, and other than for the contract movement, there is scant life to the pulpwood market. No changes of consequence are noted in quoted levels.

◆ Chemicals

Chemical quotations register few changes notwithstanding the quiet market prevailing. Bleaching powder remains on a quotable range of 2 to 2.25 cents per pound, in drums, f.o.b. works. Salt cake is $12 to $13.50 per ton at domestic shipping points, with imported $14.50 to $15 ex dock Atlantic seaboard. Sulphur is quoted at $21 per long tone for spot shipment at mines.

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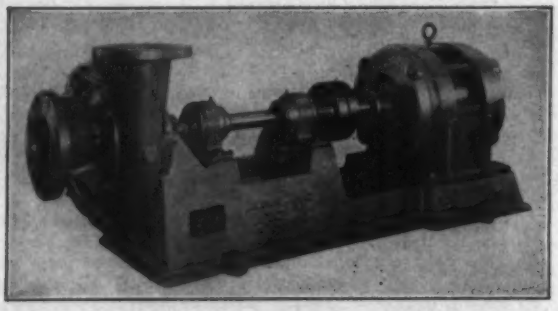

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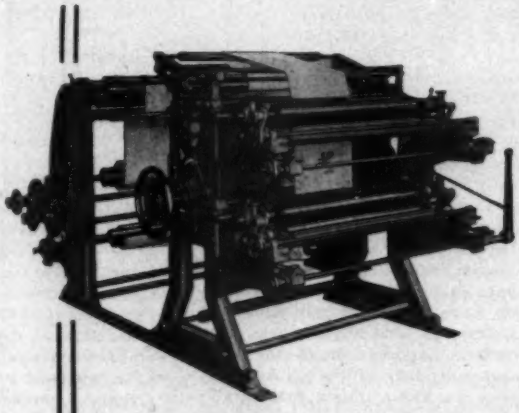

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Import and Export MARKETS

IMPORTS

◆ Wood Pulp

While trade reports say that surplus stocks of wood pulp at mills and on the docks at United States Atlantic ports are being diminished slowly; in fact, at a much slower pace than pulp consumers and importers have hoped for, figures issued by the U. S. Department of Commerce covering importations of pulp into the United States for the first months of the current year should offer encouragement to the industry, since they show an appreciable drop from receipts during the corresponding period a year ago.

During the first three months of this year, chemical pulp imports into the United States totaled 334,089 short tons, air dry weight, valued at $15,457,661, according to our Government's statistics. This represented a decrease of 181,091 tons in volume, or 35.1 per cent, compared with imports reaching 515,180 tons of a declared value of $20,672,555 in the similar time last year. Thus, with pulp from primary sources abroad coming in at a much smaller rate, it should not be long before present supplies are used up and the technical position of the imported pulp market improved.

Imports during March dropped to the unusually low total of 83,834 short tons of chemical pulp, valued at $4,177,749, the lowest point in a lengthy while and the first month in several years in which chemical pulp arrivals into the United States have been below the hundred-thousand-ton mark. Imports in February last amounted to 118,646 tons of a value of $5,314,604, and in January of this year 131,609 tons valued at $5,965,308. In the corresponding months of last year, chemical pulp imports were 172,137 short tons valued at $6,666,601 in January, 191,204 tons valued at $7,476,222 in February, and 151,839 tons valued at $6,529,732 in March.

Mechanical pulp imports amounted to 10,614 short tons, air dry weight, valued at $206,860 in March, contrasted with 12,598 tons of a value of $290,062 in February this year, and 15,443 tons valued at $297,026 in March, 1937.

The market for imported pulp continues a very quiet affair. There is a marked lack of demand of almost any character, either for spot supplies or for pulp for forward shipment from manufacturing sources abroad. Paper and board manufacturers are still more engrossed in using up pulp on hand or being received on old contracts than in giving consideration to adding to their supplies or commitments. There is perhaps some little purchasing of resale lots of pulp, but it amounts to small tonnage at best and cuts practically no figure in the market. Those consumers who have pulp they would like to dispose of have long since grown discouraged in their efforts to resell because of the dearth of buyers operating in the market. In short, for some months past the market has been filled with sellers of pulp, with few or no buyers in view.

Despite the continued paucity of buying, producers abroad are sticking to their guns and are not slashing quotations on pulp. There has been some recession, of course, but price ideas on the other side of the Atlantic are still well above quoted levels on domestic wood pulp here, and the principal reason is said to be that producers in Europe are securing much better prices in sales to markets other than the United States, and are not disposed to sell here at levels to which the American market has dropped. Meanwhile, prices of imported pulp are mainly nominal. Belief within the trade is that a readjustment must take place, but this is yet to occur. It is understood the Scandinavians have sent representatives to this country for the purpose of discussing a readjustment of prices with American customers, but reports have it that not a great deal in this direction has been achieved. Presumably a very cardinal reason is that consumers here are not yet ready to resume buying pulp, with the result it has been difficult for sellers and buyers to get together on prices.

◆ Paper

Importations of paper and paper manufactures into the United States in February, valued at a total of $6,318,748, showed a decrease of 25 per cent from both the preceding month and the corresponding month last year. Imports in January this year were valued at $8,414,573, and in February a year ago reached a value of $8,492,894. Largest individual losses were shown in pulpboard in rolls, cigarette paper, newsprint and other printing papers. The largest single gain in imports both in percentage and quantity, was in kraft wrapping paper, which rose from 413,914 pounds in January to 4,526,427 pounds in February, a gain of 994 per cent. Other large increases were shown in greaseproof and waterproof paper, with 80,957 pounds, a rise of 133 per cent; other wrapping papers, writing and drawing papers, and surface coated papers. Newsprint imports in February were valued at $5,366,456, against $7,491,465 in January this year, and $7,457,339 in February last year.

◆ Paper Stock

Imports of paper base stocks other than wood pulp continue to decline. During February, arrivals of rags for papermaking amounted to 2,468,828 pounds, valued at $87,571, according to U. S. Department of Commerce reports, compared with 5,105,419 pounds of a declared value of $113,228 in January this year, and 25,891,287 pounds of a value of $509,101 in February last year. The February imports constituted a tremendous volume drop from receipts in the same month a year ago. Miscellaneous paper stock imports, comprising old rope, scrap bagging, waste paper, etc., in February last totaled 3,192,235 pounds of a value of $78,555, against 4,960,494 pounds valued at $82,233 in January, and 9,239,490 pounds valued at $192,916 in the similar 1937 month.

EXPORTS

Exports of paper and manufactures from the United States declined in total value from $2,185,450 in January last to $1,895,201 for February, a loss of 13 per cent, according to figures issued by the U. S. Department of Commerce. Compared with the same month last year when exports were valued at $2,079,284, the February exports showed a drop of 9 per cent.

The largest single increase in exports, from a percentage standpoint, was in kraft wrapping paper, which rose from 587,358 pounds in January to 1,482,421 pounds in February, a gain of 152 per cent. This was also a rise of 180 per cent over the same month last year. It is a coincidence that the biggest increase in paper imports into the United States during February also was in kraft wrapping. While kraft wrapping exports gained substantially, all other wrapping paper showed a loss of 34 per cent, February exports totaling 1,897,805 pounds. Overissue and old newspapers, our largest export item in quantity, gained 97 per cent over January, with 16,467,283 pounds. Fiber insulating board or bat increased 44 per cent, rising from 2,889,608 to 4,167,518 square feet. Exports of newsprint paper decreased 40 per cent from January, but were ahead of the same month last year by 6 per cent. Other losses registered were in uncoated book paper of 29 per cent, cover paper 67 per cent, boxboard 75 per cent, and writing paper 23 per cent.

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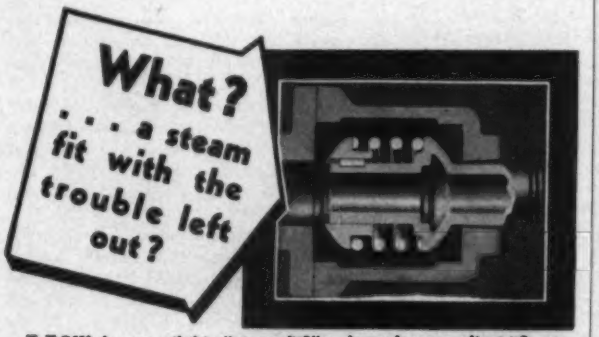

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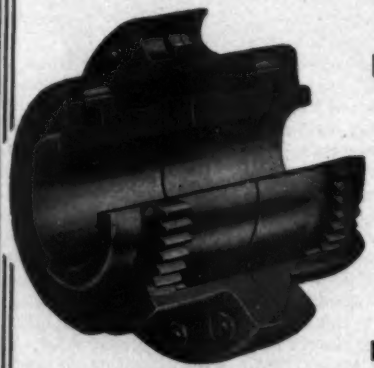

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Clifford-Wood Co.
The Jeffrey Mfg. Co.
Link-Belt Company

Embossing Machines
Hudson-Sharp Machine Co.
B. F. Perkins & Son, Inc.
Textile Finishing Machinery Co.

Engineers
Chemical Constr. Corp.
Chemical Lining Engineers, Inc.
Chemipulp Process, Inc.
Ferguson Engineers
Hardy S. Ferguson
George F. Hardy
Merritt-Chapman & Scott Corp.
Rust Engineering Co.
Stebbins Engr. & Mfg. Co.
James Stewart & Co.

Engineers (Drying)
J. O. Ross Eng. Corp.

Engineers (Heating and Ventilating)
J. O. Ross Eng. Corp.

Engines (Steam)
Lawrence Machine & Pump Co.
Morris Machine Works

Evaporators
Foster Wheeler Corp.
D. J. Murray Mfg. Co.

Exhausters
J. O. Ross Eng. Corp.

Expansion Joints (Rubber)
United States Rubber Products, Inc.

Fans (Ventilating)
B. F. Perkins & Son, Inc.
J. O. Ross Eng. Corp.

Feed Water Heaters
Cochrane Corporation
Worthington Pump & Mach'y Corp.

Feed Water Treatment
Graver Tank & Mfg. Co.

Felt Cleaning Material
Oakite Products, Inc.

Felt Conditioners
Bird Machine Co.

Felt Drying System
J. O. Ross Eng. Corp.

Felt Rolls
See Paper Machines

Felt Washers
Rodney Hunt Mach. Co.

Felt & Wire Guides
Moore & White Co.

Felts (Dryer—Asbestos)
Asten-Hill Mfg. Co.
Wm. E. Hooper & Sons Co.

Felts (Dryer—Cotton)
Wm. E. Hooper & Sons Co.

Felts (Jacket)
Appleton Woolen Mills
Buckley, Dunton & Co.
Draper Brothers Co.
F. C. Huyck & Sons
Lockport Felt Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.

Felts (Woolen)
Appleton Woolen Mills
Bulkley, Dunton & Co.
Draper Brothers Co.
F. C. Huyck & Sons
Lockport Felt Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.

Fillers (Paper)
English China Clay Sales Corporation
Titanium Pigment Corp.
R. T. Vanderbilt Co., Inc.

Filters
Cochrane Corporation
Improved Paper Mach'y Corp.
Oliver United Filters Inc.

Filters (Pressure & Gravity)
Graver Tank & Mfg. Co.

Filters (Oil)
S. F. Bowser & Co., Inc.

Fire Brick
Quigley Company, Inc.

Floor Plates (Safety)
J. T. Ryerson & Son, Inc.

Flow Meters
Bailey Meter Co.
The Brown Instrument Co.
Cochrane Corporation
Mason-Neilan Regulator Co.

Foam Killers
Hercules Powder Co., PMC
National Oil Products Co.

Folding Machines
Hudson-Sharp Machine Co.

Forming Machines
Downingtown Mfg. Co.

Fourdrinier Machines
Bagley & Sewall Co.
Beloit Iron Works
Black-Clawson Co.
Downington Mfg. Co.
Moore & White Co.
Pusey & Jones Corp.
Smith & Winchester Co.

Fourdrinier Wires
Appleton Wire Works
Lindsay Wire Weaving Co.

Friction Calenders
B. F. Perkins & Son, Inc.
Textile Finishing Machinery Co.

Fuel
Koppers Company

Galvanized Sheets (Iron & Steel)
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Gas Analyzers
The Brown Instrument Co.

Gate Hoists
Rodney Hunt Mach. Co.
D. J. Murray Mfg. Co.

Gates (Hydraulic)
Rodney Hunt Mach. Co.

Gauges (Pressure)
Bailey Meter Co.
The Brown Instrument Co.
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Gauges (Vacuum)
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Gears
DeLaval Steam Turb. Co.
Foote Bros. Gear & Machine Corp.
General Electric Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Link-Belt Company
Poole Fdy. & Mch. Co.

Gears (Herringbone)
Link-Belt Company
Poole Fdry. & Mch. Co.

Gears (Silent Chain)
Link-Belt Company

Gears (Worm)
Beloit Iron Works
DeLaval Steam Turb. Co.
Link-Belt Company
Poole Fdry. & Mch. Co.

Generating Sets
Allis-Chalmers Mfg. Co.
General Electric Co.
Penn Elec. Engrg. Co.
Westinghouse Electric & Mfg. Co.

Generators (Steam)
General Electric Co.

Generators (Turbo)
Allis-Chalmers Mfg. Co.
Chicago Electric Co.
General Electric Co.
Moorhead-Reitmeyer Co.
Westinghouse Electric & Mfg. Co.

Glass Pipe
Corning Glass Works

Governors (Speed)
Mason-Neilan Regulator Co.

Governors (Turbine)
Rodney Hunt Mach. Co.

Granite Rolls
Beloit Iron Works
Improved Paper Mach'y Corp.
B. F. Perkins & Son, Inc.

Grease
The Pure Oil Co.
Shell Union Oil Corp.
Standard Oil Co. (Ind.)
The Texas Company

Grease Cups
Link-Belt Company
The Lunkenheimer Co.

Grinders (Pulp)
Carthage Machine Co.

Grinding Wheels
Norton Co.
Simonds Worden White Co.

Hangers
Dodge Mfg. Co.
Link-Belt Company

Heat Exchangers
Fibre Making Processes
Worthington Pump & Mach'y Corp.

Heaters (Unit)
D. J. Murray Mfg. Co.
J. O. Ross Eng. Corp.

Heaters (Feed Water)
Cochrane Corporation
Worthington Pump & Mach'y Corp.

Heating Systems
J. O. Ross Eng. Corp.

Hoists (Chain)
American Chain & Cable Co.
J. T. Ryerson & Son, Inc.
Wright Mfg. Division

Hoists (Electric)
American Engineering Co.
General Electric Co.

Hoists (Portable, Air and Steam)
Allis-Chalmers Mfg. Co.

Hoods (Paper Machine)
J. O. Ross Eng. Corp.

Hose
Boston Woven Hose & Rubber Company
United States Rubber Products, Inc.

Hydrators
Love Brothers, Inc.
D. J. Murray Mfg. Co.

Hydrometers
Taylor Instrument Cos.

Hygrometers
The Brown Instrument Co.
Cambridge Instrument Co.
Taylor Instrument Cos.

Indicators (Super Heat)
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Interfolding Machines
Hudson-Sharp Machine Co.

Iron & Steel Supplies
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Joints (Dryer)
Beloit Iron Works
Carthage Machine Co.
The Johnson Corporation

Jordan Engines
Emerson Mfg. Co.
E. D. Jones & Sons Co.
Shartle Bros. Machine Co.
Smith & Winchester Co.

Knife Grinders
Covel-Hanchett Co.

Knives (Machine)
John W. Bolton & Sons
Simonds Saw & Steel Co.
Simonds Worden White Co.

Knot Saws
D. J. Murray Mfg. Co.

Knotters
Fibre Making Processes
Improved Paper Mach'y Corp.
Moore & White Co.
Trimbey Machine Works

Latex
United States Rubber Products, Inc.

Laybays
Moore & White Co.

Lead Alloy Pipe
National Lead Co.

Lead Alloy Sheets
National Lead Co.

Lift Trucks (Electric)
Automatic Trans. Co.

Lubricants
The Pure Oil Co.
Shell Union Oil Corp.
Standard Oil Co. (Ind.)
The Texas Company

Lubricating Systems
S. F. Bowser & Co., Inc.
The Lunkenheimer Co.

Lubricators
S. F. Bowser & Co., Inc.
The Lunkenheimer Co.

Machine Shop Equipment
J. T. Ryerson & Son, Inc.

Materials Handling Systems
Link-Belt Company

Mechanical Packing
Garlock Packing Co.

Metering Systems
Trimbey Machine Works

Meters
Cochrane Corporation
Mason-Neilan Regulator Co.
Taylor Instrument Cos.
Worthington Pump & Mach'y Corp.

Meters (Flow)
Bailey Meter Co.
The Brown Instrument Co.
Cochrane Corporation

Meters (Liquid Level)
Cochrane Corporation
Mason-Neilan Regulator Co.

Mill Cogs
N. P. Bowsher Co.

Mixers
Patterson Foundry & Machine Company

Motor Drives
Patterson Foundry & Machine Company

Motor Generator Sets
Allis-Chalmers Mfg. Co.
Chicago Electric Co.
Moorhead-Reitmeyer Co.,
Penn Elec. Engrg. Co.
Westinghouse Electric & Mfg. Co.

Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Penn Elec. Engrg. Co.
Westinghouse Electric & Mfg. Co.

Motors (Rebuilt)
Chicago Electric Co.
Moorhead-Reitmeyer Co.,

Napkin Folders
Hudson-Sharp Machine Co.

Oil
The Pure Oil Co.
Shell Union Oil Corp.
Standard Oil Co. (Ind.)
The Texas Company

Oil Cups
The Lunkenheimer Co.

Oil Storage Systems
S. F. Bowser & Co., Inc.

Packing (Mechanical)
Garlock Packing Co.
United States Rubber Products, Inc.

Paper Bag Machinery
Smith & Winchester Co.

Paper Calender Rolls
B. F. Perkins & Son, Inc.
Textile Finishing Machinery Co.

Paper Cutters & Slitters
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

Paper Dampeners
B. F. Perkins & Son, Inc.

Paper Machine Drives
Beloit Iron Works
Bird Machine Co.
Downingtown Mfg. Co.
General Electric Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Smith & Winchester Co.
Westinghouse Electric & Mfg. Co.

Paper Machines
Bagley & Sewall Co.
Beloit Iron Works
Black-Clawson Co.
Downingtown Mfg. Co.
Pusey & Jones Corp.
Smith & Winchester Co.

Paper Manufacturers
Kalamazoo Vegetable Parchment Co.

Paper Testing Instruments
Arthur B. Green
B. F. Perkins & Son, Inc.

Pebble Mills
Patterson Foundry & Machine Company

Penstocks
Chicago Bridge & Iron Co.
Rodney Hunt Mach. Co.

Perforated Metal
Harrington & King Perforating Co.

pH Control (Automatic)
Wilkens-Anderson Co.

Pillow Blocks
Beloit Iron Works
Link-Belt Company

Pipe
Duriron Co.
Pittsburgh Piping & Equipment Company
J. T. Ryerson & Son, Inc.

Pipe Fittings
Cooper Alloy Foundry Co.
Taylor Forge & Pipe Wks.

Pipe (Glass)
Corning Glass Works

Pipe (Lead Alloy)
National Lead Co.

Pipe (Riveted or Welded)
Chicago Bridge & Iron Co.

Pipe (Spiral Lock-Seam)
Naylor Pipe Co.

Pipe (Spiral Riveted)
Taylor Forge & Pipe Wks.

Pipe (Spiral Welded)
American Rolling Mill Co.
Naylor Pipe Co.
Taylor Forge & Pipe Wks.

Pipe Systems Installed
The Grinnell Co., Inc.
Pittsburgh Piping & Equipment Company

Pipe & Tubes (Stainless)
J. T. Ryerson & Son, Inc.

Platers
B. F. Perkins & Son, Inc.

Plates (Iron & Steel)
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Platework (Steel)
Chicago Bridge & Iron Co.

Plating (Chromium)
Chromium Corp. of Amer.

Power Transmission
Allis-Chalmers Mfg. Co.
Link-Belt Company

Press Rolls (Granite)
Beloit Iron Works
Downingtown Mfg. Co.
B. F. Perkins & Son, Inc.

Pressure Joints (Rotary)
Beloit Iron Works
The Johnson Corporation

Protective Coatings
Quigley Company, Inc.

Pulleys
Carthage Machine Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Link-Belt Company
D. J. Murray Mfg. Co.
Rockwood Mfg. Co.

Pulp (Chemical)
Weyerhaeuser Timber Co.

Pulpers
Bauer Bros. Co.

Pulp Process (Chem.)
Chemipulp Process, Inc.

Pulp Screens
Bird Machine Co.
D. J. Murray Mfg. Co.

Pulp Stones
Norton Co.

Pulp Thickeners
Bird Machine Co.
Carthage Machine Co.
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
Moore & White Co.
D. J. Murray Mfg. Co.
Oliver United Filters Inc.

Pulpwood Stackers
Link-Belt Company

Pumping Machinery
Lawrence Machine & Pump Co.

Pumps (Acid)
Duriron Co., Inc.
Oliver United Filters Inc.
Roots-Connersville Blower Corp.

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Misco "C" centrifugally cast pipe and tubes are manufactured within very precise limits as to wall thickness and concentricity and combine the best corrosion resisting properties with light weight and rugged strength. Misco "C" pipe and tubes may be had in any length, with outside diameters from 2" to 20" and wall thicknesses from ⅛" upward. Can be supplied flanged, threaded or with plain ends, and used in combination with conventional castings of any shape where special assemblies are required.

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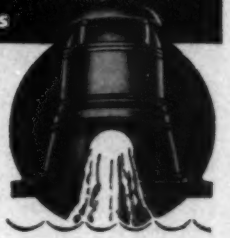

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Worthington Pump & Mach'y Corp.

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Buffalo Pumps, Inc.
Carthage Machine Co.
DeLaval Steam Turb. Co.
Downingtown Mfg. Co.
Duriron Co.
Frederick Iron & Steel Co.
Goulds Pumps, Inc.
Ingersoll-Rand Company
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Morris Machine Works
Nash Engineering Co.
Oliver United Filters Inc.
Smith & Winchester Co.
Warren Steam Pump Co.
Worthington Pump & Mach'y Corp.

Pumps (Deep Well)
Layne & Bowler, Inc.
Worthington Pump & Mach'y Corp.

Pumps (Rotary)
Roots-Connersville Blower Corp.

Pumps (Stock)
Allis-Chalmers Mfg. Co.
American Paper Machy. & Engrg. Works
Beloit Iron Works
Buffalo Pumps, Inc.
Carthage Machine Co.
Downingtown Mfg. Co.
Frederick Iron & Steel Co.
Goulds Pumps, Inc.
Moore & White Co.
Morris Machine Works
Shartle Bros. Machine Co.
Smith & Winchester Co.
Warren Steam Pump Co.
Worthington Pump & Mach'y Corp.

Pumps (Turbine)
Roots-Connersville Blower Corp.

Pumps (Vacuum)
Foster Wheeler Corp.
Nash Engineering Co.
Oliver United Filters Inc.
Roots-Connersville Blower Corp.
Worthington Pump & Mach'y Corp.

Pyrometers
The Brown Instrument Co.
Cambridge Instrument Co.
Taylor Instrument Cos.

Rag Cutters
B. F. Perkins & Son, Inc.

Rebuilt Motors
Chicago Electric Co.
Moorhead-Reitmeyer Co.,

Reclaiming Systems (Oil)
S. F. Bowser & Co., Inc.

Recording Instruments
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The Brown Instrument Co.
Cambridge Instrument Co.
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Recovery Systems (Chemical Pulp)
Chemipulp Process, Inc.
D. J. Murray Mfg. Co.
J. O. Ross Eng. Corp.

Reels
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Downingtown Mfg. Co.
Hudson-Sharp Machine Co.
Moore & White Co.
Smith & Winchester Co.

Reels (Automatic Collapsing)
Downingtown Mfg. Co.

Refiners
Bauer Brothers Co.
Dilts Machine Works
Emerson Mfg. Co.
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Love Brothers, Inc.
D. J. Murray Mfg. Co.
Wiener Refiner Eng. Co.

Regulators (Steam)
Mason-Neilan Regulator Co.

Regulators (Pressure and Temperature)
The Brown Instrument Co.
Cochrane Corporation
Mason-Neilan Regulator Co.
Taylor Instrument Cos.

Regulators (Steam)
Mason-Neilan Regulator Co.

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Oakite Products, Inc.

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Moore & White Co.
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Rod Mills
Allis-Chalmers Mfg. Co.
Patterson Foundry & Machine Company

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Roll Stands
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Dodge Mfg. Corp.
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Beloit Iron Works
Carthage Machine Co.
Downingtown Mfg. Co.
Rodney Hunt Mach. Co.
Improved Paper Mach'y Corp.
B. F. Perkins & Son, Inc.
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Downingtown Mfg. Co.
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The Johnson Corporation

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Quigley Company, Inc.

Safety Treads
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Pennsylvania Salt Mfg. Co.

Save-Alls
Carthage Machine Co.
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
Moore & White Co.
Oliver United Filters Inc.

Saws
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Simonds Worden White Co.

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United States Rubber Products, Inc.

Screen Plates
Bird Machine Co.

Screens (Centrifugal)
Improved Paper Mach'y Corp.

Screens (Chip)
Carthage Machine Co.
Fibre Making Processes
Link-Belt Co.
D. J. Murray Mfg. Co.

Screens (Diaphragm)
D. J. Murray Mfg. Co.

Screens (Flat)
Beloit Iron Works
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
D. J. Murray Mfg. Co.

Screens (Rotary)
American Paper Machy. & Engrg. Works
Bird Machine Co.
E. D. Jones & Sons Co.
Moore & White Co.
Trimbey Machine Works

Second Hand Machy.
Shartle Bros. Machine Co.

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Carthage Machine Co.

Shafting
Allis-Chalmers Mfg. Co.
E. D. Jones & Sons Co.
Link-Belt Company
Midwest-Fulton Mach. Co.
J. T. Ryerson & Son, Inc.

Shafts (Collapsible)
Cameron Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.

Sheets (Lead Alloy)
National Lead Co.

Sheets (Lead)
National Lead Co.

Sheet Metal Work
J. O. Ross Eng. Corp.

Sheets (Iron & Steel)
American Rolling Mill Co.
J. T. Ryerson & Son, Inc.

Sheets (Stainless Steel)
J. T. Ryerson & Son, Inc.

Short Center Drives
Rockwood Mfg. Co.

Shower Pipes
American Paper Machy. & Engrg. Works
Beloit Iron Works
Bird Machine Co.
Downingtown Mfg. Co.
Emerson Mfg. Co.
Moore & White Co.
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Carthage Machine Co.
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Patterson Foundry & Machine Company

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Link-Belt Company

Silicate of Soda
General Chemical Co.
Pennsylvania Salt Mfg. Co.

Sizing
National Oil Products Co.

Slashers
D. J. Murray Mfg. Co.

Slitting & Rewinding Mach.
Beloit Iron Works
Cameron Machine Co.
Downingtown Mfg. Co.
Samuel M. Langston Co.
Moore & White Co.
Smith & Winchester Co.

Sluice Gates
D. J. Murray Mfg. Co.

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Columbia Alkali Corp.
Hercules Powder Co., PMC
Mathieson Alkali Works
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.

Sodium Aluminate
Pennsylvania Salt Mfg. Co.

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Beloit Iron Works
Downingtown Mfg. Co.
Hudson-Sharp Machine Co.
Rodney Hunt Mach. Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.

Speed Changers
Rodney Hunt Mach. Co.
Lewellen Mfg. Co.
Link-Belt Co.

Speed Reduction Units
DeLaval Steam Turb. Co.
Foote Bros. Gear & Machine Corp.
Rodney Hunt Mach. Co.
Link-Belt Company
Midwest-Fulton Mach. Co.
Poole Foundry & Machine Co.

Spliiters (Wood)
Carthage Machine Co.
D. J. Murray Mfg. Co.

Sprockets
Improved Paper Mach'y Corp.
Link-Belt Company

Stainless Steel Sheets
J. T. Ryerson & Son, Inc.

Steam Joints
Beloit Iron Works
The Johnson Corporation
Shartle Bros. Machine Co.

Steam Purifiers
Cochrane Corporation

Steam Traps
Cochrane Corporation
Midwest-Fulton Mach. Co.
Stickle Steam Spec. Co.

Steel (Bars, Shapes, Plates, Sheets, Etc.)
Joseph T. Ryerson & Son

Steel Platework
Chicago Bridge & Iron Co.
Graver Tank & Mfg. Co.

Steel Strapping
The Stanley Works

Steel Tanks
Chicago Bridge & Iron Co.
Graver Tank & Mfg. Co.

Stock Cutters
B. F. Perkins & Son, Inc.

Stokers
American Engr. Co.
Link-Belt Company
Westinghouse Electric & Mfg. Co.

Strainers
Carthage Machine Co.
The Duriron Co., Inc.
Mason-Neilan Regulator Co.

Strapping Steel
The Stanley Works

Stuff Chests
Downingtown Mfg. Co.
Improved Paper Mach'y Corp.
E. D. Jones & Sons Co.
Midwest-Fulton Mach. Co.
Moore & White Co.
D. J. Murray Mfg. Co.

Suction Boxes
Beloit Iron Works
Black-Clawson Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Pusey & Jones Corp.

Suction Felt Rolls
Beloit Iron Works
Downingtown Mfg. Co.

Suction Rolls
Beloit Iron Works
Downingtown Mfg. Co.

Sulphite (Bleached)
Weyerhaeuser Timber Co.

Sulphur Burners
American Paper Machy. & Engrg. Works
Carthage Machine Co.
Chemical Constr. Corp.
D. J. Murray Mfg. Co.

Sulphuric Acid
General Chemical Co.
Pennsylvania Salt Mfg. Co.

Supercalenders
B. F. Perkins & Son, Inc.
Textile Finishing Machinery Co.

Tachometers & Tachographs
Bailey Meter Co.
The Brown Instrument Co.

Tanks and Vats (Wood)
Rodney Hunt Mach. Co.
Kalamazoo Tank & Silo Co.
New England Tank & Tower Co.

Tanks (Glazed Tile)
Kalamazoo Tank & Silo Co.

Tanks (Oil)
The Lunkenheimer Co.

Tanks (Steel)
Chicago Bridge & Iron Co.
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Tensile Strength & Stretch Testers
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Testers (Freeness)
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Mason-Neilan Regulator Co.
Taylor Instrument Cos.

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Cochrane Corporation
Cooper Alloy Foundry Co.
Duriron Co.
Eastwood-Nealley Corp.
International Nickel Co.
The Lunkenheimer Co.
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Wm. Powell Co.
Trimbey Machine Works

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The Lunkenheimer Co.
Mason-Neilan Regulator Co.

Valves (Gates)
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Valves (Multiport)
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Valves (Non-return; Emergency Stop)
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Valves (Paper Stock)
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Mason-Neilan Regulator Co.

Valves (Relief)
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Mason-Neilan Regulator Co.
Wm. Powell Co.

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Mason-Neilan Regulator Co.

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Ventilating Systems
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